



**This electronic thesis or dissertation has been
downloaded from Explore Bristol Research,
<http://research-information.bristol.ac.uk>**

Author:

Bond, Carol Susan

Title:

**Nurses in the information age : ready, willing and able? : the role of pre-registration
education in preparing nurses for working in an evolving workplace**

General rights

Access to the thesis is subject to the Creative Commons Attribution - NonCommercial-No Derivatives 4.0 International Public License. A copy of this may be found at <https://creativecommons.org/licenses/by-nc-nd/4.0/legalcode>. This license sets out your rights and the restrictions that apply to your access to the thesis so it is important you read this before proceeding.

Take down policy

Some pages of this thesis may have been removed for copyright restrictions prior to having it been deposited in Explore Bristol Research. However, if you have discovered material within the thesis that you consider to be unlawful e.g. breaches of copyright (either yours or that of a third party) or any other law, including but not limited to those relating to patent, trademark, confidentiality, data protection, obscenity, defamation, libel, then please contact collections-metadata@bristol.ac.uk and include the following information in your message:

- Your contact details
- Bibliographic details for the item, including a URL
- An outline nature of the complaint

Your claim will be investigated and, where appropriate, the item in question will be removed from public view as soon as possible.

Nurses in the Information Age:

Ready, Willing and Able?

The role of pre-registration education in preparing
nurses for working in an evolving workplace.

Carol Susan Bond

A dissertation submitted to the University of Bristol in accordance with
the requirements of the degree of Doctor of Education in the Faculty of
Social Science and Law, January 2006.

Word Count 45,473

Abstract

The computer is becoming a routine tool in the nursing workplace. This offers nurses the opportunity to use the Internet to access evidence based information to support care giving, information to support their patients manage their health, and a range of systems for efficient record keeping and quality enhancement. To achieve this nurses need a variety of skills and knowledge, including information governance.

A mixed methods longitudinal study was undertaken with a cohort of student nurses to explore how ready, willing and able they were to engage with the nursing informatics agenda, and the factors that affected this.

The students in this research were found to have quite poor computer skills at the start of the course. There was low use of applications, and the use was unsophisticated. Students were unaware of the skills required and were unable to assess their own skill levels. The students considered that computers were important for nurses and were a good information source for patients, and expressed a willingness to engage with them during their course.

The support received in practice varied between, and within, organisations. The most frequent scenario was that the qualified nurses supporting students had poor skills, low awareness of nursing informatics and did not encourage the students to use computers.

Nursing informatics needs to be explicitly and consistently included in pre-registration nursing courses. This needs to be supported by academic staff with nursing informatics expertise in order to provide support for integrating nursing informatics into both theory and practice elements of the student's education. A model for nursing informatics in pre-registration education is proposed.

The aim being to break out of a vicious circle of poor awareness of nursing informatics in the university based elements of the course, and a lack of interest in practice leading to students being unaware of the scope of nursing informatics, and socialised into a nursing model that does not value nursing informatics. This can be achieved by creating an upwards spiral, building on the students willingness to engage, ensuring that they develop nursing informatics expertise and are ready to use it in practice thus providing positive role models for future students.

Authors Declaration.

I declare that the work in this dissertation was carried out in accordance with the Regulations of the University of Bristol. The work is original, except where indicated by special reference in the text, and no part of the dissertation has been submitted for any other academic award. Any views expressed in the dissertation are those of the author.

Signed _____ Date _____

Acknowledgements

In no particular order, as the support of everyone has been crucial in its own way, I would like to offer my thanks to

My husband and son, Ken and Daniel, for their practical and emotional support

Dr Sally Barnes, my supervisor for her academic advice and support

My work colleagues, particularly Chris and Dave who made sure that all the work was covered giving me the time to complete my research

Bournemouth University for allowing me to undertake the EdD programme and granting me a term's study leave to complete the dissertation

The students and nurses who gave their time to answer my questions

Table of Contents

1	AIMS AND SCOPE OF THE DISSERTATION	9
1.1	Background	9
1.2	Terminology	11
1.3	Aims and Scope of the research	12
1.3.1	The Research Question	13
1.3.2	Literature Review	13
1.3.3	Research	13
1.4	Structure of the Dissertation	14
2	POLICY FRAMEWORK	17
2.1	Nurses' Informatics Requirements	17
2.1.1	The NHS Context	17
2.1.2	Professional Registration Requirements	23
2.2	Education Requirements	24
2.3	Summary	25
3	UNDERPINNING THEORY AND DISCIPLINES	26
3.1	Computer Literacy and Information Literacy	26
3.2	Health and Nursing Informatics	30
3.2.1	Health Informatics	31
3.2.2	Nursing Informatics	32
3.2.3	Patient Information / Consumer Health Informatics	35
3.3	Nursing and Academia	38
3.4	Computer Use in Society	41
3.5	Efficacy and Attitudes	42
3.6	Computer Use, Anxiety and Age	43
3.7	Nursing Informatics Education Requirements	45
3.7.1	Why Informatics is Needed	45
3.7.2	Quality and Evidence Based Care	45
3.7.3	Electronic Systems in Practice	46
3.7.4	Involvement in Informatics Developments	47

3.7.5	Electronic Communication and Support Systems	47
3.8	Informatics Skills Needed by Nurses	47
3.8.1	Basic Computer Skills	49
3.8.2	Information Literacy	49
3.8.3	Electronic Communication	50
3.8.4	E-learning	50
3.8.5	Clinical Systems	50
3.8.6	Care Support Systems	51
3.9	Skill Level Required	51
3.10	Informatics Requirements in Pre-Registration Curricula	52
3.11	Nursing Informatics in Pre-Registration Curricula	54
3.12	Are Nurses Ready Willing and Able?	59
3.13	Summary	70
4	RESEARCH METHODS	72
4.1	Research Philosophy	72
4.2	Research Design	77
4.3	Ethical Considerations	80
4.4	Data Collection	83
4.4.1	Phase 1.	83
4.4.2	Phase 2.	85
4.4.3	Phase 3.	87
4.5	Data Analysis	90
4.6	Summary	92
5	RESULTS, PHASES 1 AND 2	93
5.1	Questionnaire 1	93
5.1.1	Background to Questionnaire One	93
5.1.2	Demographic Information	93
5.1.3	Computer Ownership and Internet Connection	94
5.1.4	Use of, and Attitudes Towards, Computers	94
5.1.5	Students' Skills Levels	99

5.1.6	Classifications of Computer Use and Skills	102
5.2	Questionnaire 1 Results Summary	107
5.3	Questionnaire Two	109
5.3.1	Background to Questionnaire Two	109
5.3.2	Recreational use of Online Information Sources	109
5.3.3	Academic Uses of Information	110
5.3.4	Use Classifications, Recreational and Academic use	114
5.4	Questionnaire 2 Results Summary	115
5.5	Year 1 Results Summary	116
6	RESULTS, PHASE 3	117
6.1	Background to Questionnaire Three	117
6.2	Use of Information Sources	117
6.3	Computers on Practice Placements	119
6.3.1	Computer Availability and Use	119
6.3.2	Encouragement to Use Computers	122
6.3.3	Skills	125
6.3.4	Skills and Encouragement	126
6.3.5	Predictors of use in placement	126
6.3.6	Training	126
6.4	Questionnaire 3 Results Summary	132
6.5	Group Interviews	133
6.5.1	Group Interview with Senior Nurses	134
6.5.2	Group Interviews with Ward Based Nurses	140
6.6	Summary of Group Interviews	143
6.7	Summary of Phase 3 results.	144
7	DISCUSSION	146
7.1	Expectations and Use of Information and Technology in Practice	146
7.1.1	Use, and potential use, of computers in practice	147
7.2	Skills and Knowledge Required	149
7.3	Ready? - New Students' IT Skills and Experience	150

7.4	Able? – Computer use and expertise in practice	153
7.5	Willing? - Students' Placement Experience	157
7.6	Exploration of the reasons for the barriers found.	159
7.6.1	Nursing Informatics in Practice	159
7.6.2	Informatics in Pre-Registration Education	162
7.7	Shared Responsibility	164
7.7.1	Practice	167
7.7.2	Education	167
7.8	Nursing Informatics Programme Proposal	168
7.9	Summary: Ready, Willing and Able?	171
8	CONCLUSIONS	175
8.1	The Research	175
8.2	Areas for Further Research	176
8.3	Ready, Willing and Able?	178
8.4	A Vicious Circle	178
8.5	Breaking the Circle; Creating an Upward Spiral	179
9	REFERENCES	180
10	APPENDICES	192
	Appendix 1. Universities included in the course content review	192
	Appendix 2. Health Informatics Programme	193
	Appendix 3. Questionnaire 1	195
	Appendix 4. Questionnaire 2	198
	Appendix 5. Questionnaire 3	201
	Appendix 6. Task Ability and Self Perception of Skills	205

Figures

Figure 1.	Internet use by age and gender (Matheson & Babb 2002)	43
Figure 2.	Diagram of Study Timetable	78
Figure 3.	Responses to attitude to computers statements	95
Figure 4.	Age and students confidence in using computers	96
Figure 5.	Software use in previous 3 months	97

Figure 6. Online services often used.....	98
Figure 7. Students' reported skill level with various type of software.....	99
Figure 8. Task ability and perception of skills	100
Figure 9. Frequency of use of software applications	103
Figure 10. Skills and Use classifications.....	105
Figure 11. Age and confidence in skills	105
Figure 12. Age and ability to carry out tasks	106
Figure 13. Skills and attitudes	107
Figure 14. Use of Internet for recreational tasks.....	109
Figure 15. Use of online sources for assignment	112
Figure 16. Academic Information sources used.....	113
Figure 17. Use of online information sources.....	114
Figure 18. Number of online information sources used	118
Figure 19. Mentor and Student use of computers.....	121
Figure 20. Placement location and feeling encouraged to use IT	123
Figure 21. Training Opportunities	127
Figure 22. Reasons for not attending IT training.....	128

Tables

Table 1. Key Informatics related policy documents	20
Table 2. Age profile of registered nurses.....	44
Table 3. Stakeholders Views on IT and Nursing	53
Table 4. Typology of Group Interviews	80
Table 5. Skills classification based on students' perceptions	104
Table 6. Skill Classification, group sizes.....	104
Table 7. Student and Qualified Nurse uses of IT	122
Table 8. Comments about encouragement to use computers.....	124
Table 9. Use with mentor / student feeling encouraged to use computers ..	125

1 Aims and Scope of the Dissertation

1.1 Background

Computing within the UK National Health Service NHS has a mixed pedigree. In the early 1990s the emphasis was on information for management purposes (NHS Executive 1998). This led to many health professionals feeling that there was no benefit to them, or their patients, in using computers. The publication of Information for Health (NHS Executive 1998) was meant to change this emphasis, moving the focus to the patient and how IT could be used to improve both patient care and the patient experience. This was a seminal publication, seeking to radically change the information culture in the NHS. The aims included:

- Ensuring that professional staff have access to up to date information on which to base their practice.
- Speeding up, and easing, access to services for patients
- Improving communication flows of essential patient information including creating a national electronic patient health record system
- Ensuring that patients and carers are informed about the NHS and best practice in relation to their condition

To deliver this new and challenging agenda the NHS identified that there was a need to develop a culture where informatics skills were seen as a core requirement for professionals, and as some thing that needed to be integral in all stages of clinical education.

Availability and use of both computers and the Internet is undoubtedly increasing. Both are becoming more available, and are less expensive than they were even at the start of the millennium. The NHS has invested an initial £2.3 billion in the National Programme for IT for the period to 2005-06, and has let contracts for seven to ten years which total around £6.2 billion in procuring computer equipment and programmes to support its strategies (NAO 2004).

Information, within the NHS strategy, has a very wide meaning. It encompasses the information needed for management, both locally and nationally; clinical coding systems; patient record systems; the information needed by professionals to deliver high quality care and the information needs that patients have to enable them to make informed choices about lifestyle, medical conditions and treatments.

Nurses need to be able to understand the role of information within the organisations they work in, and its role in supporting their professional practice. Computers are becoming more common on hospital wards, and the NHS strategy seeks to make electronic systems the main source of information for professionals. This information falls into four main areas:

➤ Information in Support of Professional Practice

Ensuring that the care given meets professional expectations. Traditionally this need has been met formally through the use of hospital libraries or small ward based collections of information specific to the conditions commonly encountered in that setting. With the availability of the Internet, NHSNet and Trust intranets this can be achieved more efficiently by electronic means. This has the advantage that quick access to a wide range of information is now available. Nurses no longer, in theory, have to leave the ward to visit the library to find essential information. The information available at Trust level can include information about local treatment and care protocols for conditions nursed within the Trust. Access is also available to information on best practice information, e.g. the Cochrane database, and e-journals.

➤ Information for Patients

Providing appropriate information and access to support systems for patients, and helping them to develop information skills that will help them to understand their condition and treatment and be in a position to take, or to share, responsibility for their long term health, and give informed consent to treatment.

➤ **Operational Information**

Includes all aspects of using electronic patient records and patient care planning systems.

➤ **Specialist Care Support Systems**

Such as those used in telemedicine, or to support services such as NHS Direct

1.2 Terminology

Various acronyms are in use across the education and NHS sectors and they tend to be used interchangeably, for example IT (Information Technology), ICT (Information and Communication Technology), MIS (Management Information Systems) or IM&T (Information Management and Technology). As with all language these terms are not value free. There is academic debate about whether 'IT' automatically includes communication or if 'ICT' is a slightly different thing. Within the NHS the term used can have negative connotations because of the connections that people make between the term and the policy emphasis associated with it, for example IM&T is linked to the centrally focused policy of the early 1990's. In this dissertation the term IT will be used and is taken to encompass communication and information management, however other terms are used in other works and they will be accepted as being interchangeable terms.

The skill and knowledge base that nurses require is also not easy to label. Informatics (or more specifically Nursing Informatics or Health Informatics) are terms used in various documents, but even within documents produced by the same organisation there is no consistent definition in use. Computer literacy and information literacy are also used when discussing nurses skills and knowledge requirements. The relationships and significance of these terms will be explored in Chapter 2, however nursing informatics will be the

term adopted in this thesis to embrace all of the IT related skills and knowledge needed by nurses.

In education the terms programme and course are used interchangeably by different organisations, and by different researchers. Both are used to mean a complete educational process for a student to gain an academic award and in the case of nursing programmes professional registration as a nurse.

Themes, units and modules are component parts of these educational programmes.

1.3 Aims and Scope of the research

The government wanted much from Information for Health (NHS Executive 1998) and it's subsequent policies for developing IT in patient care. The period from 1999 to 2003 especially was characterised by numerous policy and implementation documents. This should have been an ideal opportunity for nursing informatics to be embedded in nursing curricula to support the culture change that the government was seeking.

This dissertation, through a review of literature and empirical research, will explore how nurses are prepared for this evolving working environment in their pre-registration education. It will

- Discuss the statutory and policy drivers for embedding nursing informatics in practice, and in pre-registration education
- Identify the nursing informatics elements needed in pre-registration education
- Explore the factors that influence how student nurses develop the necessary nursing informatics skills through their pre-registration education programme

As the nursing culture and student experience differs across nursing specialisms the focus of this research is on the adult nursing branch.

1.3.1 The Research Question

The question that this research addresses is: Are nurses entering the profession ready, willing and able to utilise information and technology to support their professional practice and development?

To fully explore this question there are two main activity areas. One is an extensive literature review, covering several related areas to ensure a rounded view is taken, rather than just an NHS centric one. The second activity is empirical research with student nurses and the qualified nurses who support them in practice.

1.3.2 Literature Review

The literature review has two parts. The first sets out to address the question of what the informatics skills and knowledge base that nurses in the future will need are, and how are they being developed in pre-registration nurse education. This is explored through:

- Reviewing NHS policies on the development of IT
- Reference to current professional competencies as they are the minimum current requirements which should be being met;
- Exploring concepts of computer literacy and information literacy and health and nursing informatics to see how these contribute to understanding nurses' needs

The second part of the literature review focuses on exploring existing research into nurses' computer skills, attitudes and use, and nurse education.

1.3.3 Research

The empirical research is then presented, following a cohort of student nurses, looking at their preparedness, and willingness, to engage with the nursing informatics agenda. This explores the factors that influence this throughout their pre-registration education, including the effect of their

practice experience. The first phase of this research explores the use that students have made of IT prior to their course; their familiarity with computers and their skills levels. The second phase explores their information seeking behaviour once they have started their studies. The third phase explores how the students are using IT towards the end of their course. This includes consideration of academic use, and the impact of the clinical experience on how well prepared the students feel.

My role as a senior lecturer in health informatics has generated my interest in carrying out this research. My experience of teaching student nurses has suggested that they may not be well equipped to work well within this information and computer rich environment when they start their nursing education. Anecdotal information from the students suggests that their practical experience does not prepare them well either. They do undertake a health informatics theme as part of the theoretical part of the course being studied. This however was initially developed when Information for Health was published in 1998 and has evolved from an IT skills theme into a more comprehensive health informatics theme. What needs to be included in pre-registration education courses in the future is one of the questions that this research aims to identify. The findings will, hopefully be of value to any English pre-registration course, and should also be able to inform nurse education in any developed country where IT is available to nurses.

1.4 Structure of the Dissertation

That nurses need a set of skills and knowledge relating to nursing informatics and its' role in information, education, continuing professional development/life long learning, clinical care, medical records and patient support seems to be a universal truth. Exactly what skills and knowledge is however open to discussion, with those involved tending to look at the needs from a particular professional or policy standpoint. This study explores the

various schools of thought, attempting to transcend individual professional lenses and placing the needs of the nurse at the heart of the review.

Chapter two reviews how the NHS has developed its information strategy and identified the skills needed by nurses. It also considers policy documents addressing competencies from other organisations involved in the education of nurses, the Nursing and Midwifery Council (NMC) and the Higher Education Quality Assurance Agency (QAA). It includes an exploration of the skills, competencies and knowledge that nurses need to support their professional practice.

Chapter three locates these skills, competencies and knowledge within existing theories of literacy that apply to the professional use of computers. These include discussion from outside of the NHS and nursing professional arenas which help to illuminate the underpinning skills and knowledge that nurses may need to work within an information and technologically rich environment. It also explores the disciplines of health informatics and nursing informatics to see how these specialised areas add to the understanding of the needs of the nurse.

Having articulated the needs of the newly qualified nurse and the requirements of pre-registration education chapter three then moves on to explore how ready, willing and able nurses are to engage with the information age, and use computers to help them in their work and professional development.

The methodology and research methods used are discussed in chapter four. The methodological philosophy underpinning the research is discussed, and the data collection undertaken is described. The ethical considerations are

explained, along with how they were addressed. The results of the first two phases, undertaken in the first year of the students' course, are presented in chapter five. Those from the third phase of the research, undertaken in the students' final year, are presented in chapter six.

The key findings from the literature review and the research are discussed in chapter seven. Finally the dissertation draws conclusions from the discussion, which are explained and justified in chapter eight, and areas for further research which have arisen from this research are identified.

2 Policy framework

Computing and information in the NHS are moving targets. Documents are published by the NHS, policies developed, contracts let and organisations re-arranged all in a short space of time. The sections of this literature review relating to Government policy focus on the period from the publication of *Information for Health* in 1998, until the end of 2004. This is for two reasons, one is that a cut off date had to be set otherwise the dissertation would never be finished. The other is that the NHS made major changes to its structure in April 2005 with the closing of the NHS Information Authority (NHSIA) and the formation of Connecting for Health and the Health and Social Care Information Centre, and it was not timely to try to include these new developments in the dissertation.

2.1 Nurses' Informatics Requirements

2.1.1 The NHS Context

Computing policy within the NHS has moved away from the management focus of the early 1990's which led to many health professionals becoming disillusioned, seeing no benefit to them, or their patients, in using computers. *Information for Health* (NHS Executive 1998) signified a major policy change, for the first time it shifted the focus onto the patient and promoted IT as a tool that could be used to improve both patient care and the patient experience. Nurses would need the skills to not only meet their own information needs, but to also help patients to access and understand information that had previously been only accessible to professionals.

To deliver this new and challenging agenda the NHS identified that there was a need to develop a culture where informatics skills were seen as a core requirement for professionals, and for all stages of clinical education. The NHS then turned its attention to the skills and knowledge that health care

professionals need to work effectively in this information era. Several different branches of the NHS were involved in producing strategies and supporting information, the main ones being the Department of Health, (DoH), the NHS Executive, and the NHSIA. A summary of the key documents published is included in table 1 below.

Year	Policy
1999	<p>Working Together with Health Information (NHS Executive 1999a)</p> <p>Identified needs as</p> <ul style="list-style-type: none"> Gaining wide acceptance for the use of information technology as an integral part of a health care professional's role Improving the level of understanding of information management in clinical practice All health information users to be competent and confident in using information in their own role and sharing information (confidentially, safely and securely) Clinical staff to enable patients/clients and carers to access, understand and use information
1999	<p>Learning to Manage Health Information (NHS Executive 1999b)</p> <p>Education should include</p> <ul style="list-style-type: none"> Communication Knowledge Management Data Quality and Management Confidentiality and Security Secondary Uses of Clinical Data & Information Clinical and Service Audit Working Clinical Systems Telemedicine and Telecare
1999	<p>Information Matters (NHS Executive 1999c)</p> <p>That effective use is made of information for communication, decision making, delivery and management of healthcare</p> <p>The value of the clinical information required for delivering patient care is appreciated</p> <p>Knowledge and skills in information management and technology are learned and assessed</p> <p>Learning to manage information is integrated into personal and organisational development</p>
1999	<p>Information for Practice (NHSIA)</p> <p>Professionals encouraged to question their information habits and to ask themselves</p> <ul style="list-style-type: none"> What information do I need? How do I get hold of it?

	<p>How do I know if it's good information? How can I manage that information for the benefit of my patients/clients? How can I contribute to the information about clinical practice in my profession?</p> <p>Skills identified as necessary</p> <ul style="list-style-type: none"> Basic skills in operating the computer and file management Preparing information Processing information Presenting information Evaluate the use of IT Know what various software packages do
2001	<p>Building the Information Core (Department of Health)</p> <p>Updated Information for Health and linked it to the NHS Plan (HMSO 2000) and heralded a major multi billion pound investment programme in new computers and systems. Included e-learning as part of the informatics agenda ECDL adopted as the reference standard for IT skills for all NHS staff</p>
2001	<p>Health Informatics Competency Profiles for the NHS: Guidance on Skill & Knowledge Levels in Information Management and Information & Communications Technology for NHS staff to support the successful implementation of Information for Health and Building the Information Core - Implementing the NHS plan (NHSIA 2001a)</p> <p>Identifies the Health Informatics competencies required of a range of NHS staff. Qualified nurses are expected have skills in:</p> <ul style="list-style-type: none"> Data Quality, Information Management, Clinical Informatics, Security & Confidentiality, Knowledge Management (including patient information) Basic Computing and Basic Applications Computer Systems Strategic Development, Communications Technologies Health Informatics Skills System Development
2002	<p>Learning to manage health information: A theme for clinical education, Moving Ahead (NHSIA 2002a)</p> <p>Identified key areas for education programmes</p> <ul style="list-style-type: none"> Communication - authoring & reading health records, clinical language and teamworking Knowledge management Data quality and management Confidentiality and security Secondary uses of clinical data and information Clinical Governance and service audit Working clinical systems Telemedicine and telecare Basic computer skills

2002	<p>Health Informatics Skills and Competencies – A Framework to Support NSF Implementation (NHSIA 2002b)</p> <p>Identifies that engaging with IT is important for all professionals, including: basic IT skills (ECDL) knowledge management and information management skills understanding personal responsibility for maintaining confidentiality and data security</p>
2002	<p>Delivering 21st Century IT Support for the NHS; National Strategic Programme (DoH 2002c)</p> <p>Launched the National Programme for IT (NPfIT), focused on the development of computer systems and their procurement over the period 2004 – 2010</p>
2003	<p>Informing Healthcare, (Welsh Assembly Government)</p> <p>Five themes underpinning delivery of a vision for better use of information and IT: A single integrated electronic record The empowerment of the workforce through information literacy and IT tools The empowerment of patients and carers through shared decision making about care Service improvement, supported by technology High quality knowledge and information management</p>
2004	<p>Knowledge and skills framework (KSF) (DoH 2004a) and Agenda for Change (DoH 2004b)</p> <p>Both are personnel policies applicable to all NHS staff. Nursing informatics skills are included implicitly rather than explicitly in KSF core functions and Agenda for Change key criteria</p>
2004	<p>Review of NHS arms lengths bodies (DoH 2004c)</p> <p>Announced the closure of the NHS Information Authority</p>

Table 1
Key Informatics related policy documents

Various terms are used in the plethora of documents produced including ICT, information management, computer skills and health informatics. Even where the same term is used in different documents it is not necessarily defined in the same way.

The documents fall into two categories. There are policy documents that identify major government initiatives for developing the NHS and its IT

policies, and there are supporting documents that provide guidance on implementing these policies. There is a high degree of consensus through these documents. The policy documents wish to see a culture in the NHS that promotes the development and use of health information skills in support of practice.

'Information searching techniques, critical appraisal of knowledge, and research will be commonplace activities for healthcare professionals' (and) therefore it is clear that all staff involved in delivering modern NHS services require knowledge and competency in health informatics (NHSIA 2002c p5)

An important consideration is that not only will nurses need to be competent to support their own work, but that they will also need these skills to support patients

'As patients and public gain access to clinical information there is a rising expectation that professional staff will also be "information empowered".' (NHSIA 2002a p4)

The implementation documents all place importance on staff being supported to develop the skills that they will need to work within that culture. The exact skills needed are described differently in various documents, but there is a central core comprising basic computer skills, information handling skills and knowledge of the use of systems that run through them all.

A major development in policy was announced with the publication of Delivering 21st Century IT Support for the NHS; National Strategic Programme (DoH 2002c). This strategy launched the National Programme for Information Technology (NPfIT), which focused on the development of computer systems and their procurement over the period 2004 – 2010 rather than on clinical staff skills, although it did acknowledge that

'The majority of NHS professional staff require some level of education, training and development in almost all Health Informatics topics'. (p13)

The NHS's personnel policy has developed with the introduction of a new knowledge and skills framework (KSF) (DoH 2004a), intended to apply to all NHS staff. The framework has six core competencies, which apply to all NHS jobs, and a further four groups of specialist competencies that apply to some posts. These specialist competencies include an Information and Knowledge group. This is related to the Agenda for Change (DoH 2004b), which, working with the KSF, is evaluating all posts to ensure consistency across all types and groups of staff. There is no one profile for different types of posts, each employer is required to develop their own and share them through a confidential NHS website. In May 2005 this only contained one nursing profile, that for a Clinical Nurse Specialist – Educator (NHS Modernisation Agency 2005)

Whilst it is too early to be sure how these initiatives will develop neither scheme specifically identifies core competencies in IT or informatics. Various elements that need to be underpinned by health informatics skill and knowledge are included within some competencies, for example electronic communication is included in the Communications core competency. One problem with this approach is that traditionally nurses have considered communication skills to be synonymous with interpersonal skills, frequently focused on patient communication rather than communication within the multi professional team. Bowles et al (2001) in discussing nurses and communication skills focus on nurse-patient interactions, focusing on 'talking' and counselling skills such as empathetic listening. Chant et al (2002) in a systematic review of 200 articles found that terms such as communication skills and interpersonal skills were being used interchangeably and in focusing on communication skills and strategies looked at topics such as empathy, questioning and relationship development.

2.1.2 Professional Registration Requirements

A major report into pre-registration nurse education was undertaken by Sir Leonard Peach (UKCC 1999), which identified that

'Nurses and Midwives must be competent in the use of IT to improve care provision and for professional development' (p41)

The requirements of nurse education are set out in Statutory Instrument 2000 No. 2554 (HMSO 2000). The body that implements and oversees this is the Nursing and Midwifery Council (NMC). The need for nurses to have skills in, and understanding of, both information and technology is demonstrated by the NMC requirements for registration (UKCC 2001). The NMC state that entry onto the register (i.e. qualified nurse or midwife status) requires that the entrant can:

- *Provide relevant and current health information to patients, clients and groups in a form which facilitates their understanding and acknowledges choice/individual preference (p 13)*
- *Demonstrate key skills (p19)*
 - *Literacy – interpret and present information in a comprehensible manner*
 - *Information technology and management – interpret and utilise data and technology, taking account of legal, ethical and safety considerations, in the delivery and enhancement of care*
- *Demonstrate literacy, numeracy and computer skills needed to record, enter, store, retrieve and organise data essential for care delivery. (p18)*

The Nursing and Midwifery Order 2001 (HMSO 2002) requires the NMC monitor programmes which lead to registration annually to ensure that they meet NMC requirements.

A recent report, (SNMAC 2005) is proposing a radical review of nurse education, suggesting that in light of the rapid advances happening in, amongst other things, healthcare, epidemiology and information technology the present education model may no longer be 'fit for practice'. The shift to a knowledge management economy demands that the workforce is computer literate. There is concern to ensure that the changes are predicated on a base

of sustainability, key factors of which are knowledge management, knowledge development and retrieval.

2.2 Education Requirements

The Quality Assurance Agency for Higher Education (QAA) has established subject benchmarks, these include a set of benchmarks for healthcare professionals including nursing, the function of which is described as (QAA 2001)

'(providing) a means of describing the nature and characteristics of programmes of study and training in health care. They also represent general expectations about standards for the award of qualifications at a given level and articulate the attributes and capabilities that those possessing such qualifications should be able to demonstrate.'
(p3)

The status of the benchmarks is stated as not being to identify a national curriculum for healthcare programmes, rather to specify 'threshold standards' that higher education establishments are expected to adopt as the minimum standard for their awards.

The Benchmark statement: Health care programmes document (QAA 2001) contains benchmarks for general healthcare education programmes, as well as a set of benchmarks specifically for nursing programmes. The subject benchmarks for nursing are more explicit in their inclusion of IT than the more general benchmark requirements of general healthcare education programmes, identifying specific expectations of a registered nurse at the point of qualification. Three of the benchmarks are directly relevant to informatics:

- B2.** *Use evidence-based options to facilitate patient choice and inform nursing interventions (p10);*
- B3.** *Understand and interpret numerical data appropriately; Use information technology applied to the needs of the patient/client or client group (p10);*
- C2.** *Information Technology. The award holder should be able to: use word processing, email, spreadsheets and databases; access health care research and literature databases; use the internet as an information source; use relevant electronic patient information systems. (p13)*

Some of the benchmarks, e.g. those in C2, are very focused on the computer technology available. Others, such as B2, are less specific, but an ability to use computers effectively will assist the nurse to be able to meet the benchmark requirement because of the ease of access that it affords, through both direct access to information, and ease of locating information sources through library and professional databases, e.g. CINAHL and the British Nursing Index.

2.3 Summary

This part of the literature review has explored the official policy underpinning nursing informatics. The UK government including the Department of Health and the National Health Service, and various NHS bodies, such as the Information Authority have produced a plethora of policy documents and initiatives. Whilst the documents take slightly different foci there is a common thread of the importance of IT and nursing informatics to the development of healthcare, and the need for NHS staff, including nurses, to have the skills to work effectively within this new environment.

This is supported through to the professional requirements for registration as a nurse. IT is featured as a requirement in nurse education through both professional requirements, and academic quality standards.

3 Underpinning Theory and Disciplines

This section of the literature reviewing nurses' use of IT has, in the main, been restricted to papers published after 1998. The reason for this is that computers are developing rapidly and the computer culture, and the experience of users, was very different even at the start of the 1990s to the middle of the decade. A key stage in the diffusion of computing in society was the release of Windows 95, which provided a user-friendly computer interface, which enabled non-experts to use computers in a way not previously possible. This, coupled with developments in the internet around the same time, mean that papers published before 1998 were based on research that either pre-dated these changes, or were carried out in their very early stages, and are therefore likely to be based on users experiences of computers very different to those of the latter part of the final decade of the last century and the early part of this one.

No country limitations were placed on searches, however where the nursing culture or policy framework that the research was undertaken in would affect the results they were only included when they arose from countries with similar nursing tradition and policy background. The majority of papers included here arose from UK research, but it also includes literature from Europe, Australia, New Zealand, the USA and Canada.

3.1 Computer Literacy and Information Literacy

Computer literacy according to Martin (2002) has moved through three phases, each phase characterised by a shift in emphasis. The initial phase he calls the Mastery phase, the computer being seen as 'arcane and powerful' and the definition of literacy being the ability to master the machine. This phase lasted until the mid 1980's when it was superseded by the Application phase. Martin sees the development of the graphical user interface (GUI), especially Windows, as being key to the shift away from the machine and to

the various commercial applications that were developed by the programmers for people to use. This phase is said to last until the late 1990s.

This leads into Martin's third, and current, phase of computer literacy, the Reflective phase. This is where computers and software are seen as a normal everyday tool, and there is an expectation that people will be able to use them. The focus of attention moves to evaluating the use of the tool (Martin 2002 p2):

- *deciding upon appropriate use of applications,*
- *evaluating the data which they give access to,*
- *interpreting the information they generate, and*
- *deciding upon appropriate use of the resulting document or product.*

More recently computer literacy was less specifically defined as 'The ability of an individual to interact with a computer' by Poynton (2005). The areas of Internet activity suggested by Poynton (2005) start to expand into the area of information literacy. The co-dependency of computer literacy and information literacy was discussed Johnson & Eisenberg (1996). They asserted that there was only a 'vague notion' of what computer literacy actually was, but considered that most computer literacy curricula were *'little more than laundry lists of isolated skills'* (p14) based mainly around knowledge of the components of a computer and using basic software packages. They consider that these skills need to be learned in the context of information skills, which they identify as including:

- Task definition – identify information needs
- Information seeking strategies – identify all potential information sources
- Locating and accessing information
- Use Information – determine relevance and extract information
- Synthesis – organise and communicate information
- Evaluation – judging both the information found and the process

Whilst computer literacy has its base in computer science departments, Information literacy has its roots in librarianship. Historically university libraries were places that housed, or even guarded, collections of books. The Harvard Corporation in 1707 agreed that the primary function of the 'library-keeper' was to protect books, and exercise control over their use (Rice-Lively & Racine 1997). Over 100 years later Dewey (1876, cited Rice-Lively & Racine 1997) proposed that the role of the librarian should be to not only organise the collections but also to help students to identify their information needs and plan to meet them. This was radical in its day, however it would now be universally recognised as one of the roles of the academic librarian. It therefore perhaps is inevitable that the librarian profession has taken the lead in defining and developing the concept of information literacy.

Saranto & Hovegna (2004) argue that developments in the health area such as electronic patient records and clinical information systems have made information literacy as important to health professionals as it is to librarians.

The American Libraries Association (ALA) (1989) said that:

'To be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information'

The concept of Information Literacy was considered to be an 'exercise in public relations' by Foster (1993) who said that it was merely an attempt to create a role for librarians faced with the loss of their traditional role of custodian of information.

Four years later Snavely & Cooper (1997) argued that there was no one clear definition of information literacy, which resulted in ambiguity and a lack of clarity about the concept. Whilst expressing concern that the term is meaningless they also recommend that librarians use it to reflect the 'unique contribution of the library to learning'. They also caution that librarians need

to stress that information literacy is not the same as the attainment of computer skills.

The Society of College, National and University Libraries (SCONUL 1999) take the view that information literacy embraces both information technology skills and information skills. Corral (1998) however draws distinctions between IT skills and 'information handling skills' identifying information handling as concerning '*information sources, evaluation criteria, navigation methods, manipulation techniques, and presentation issues*'. She expresses concern that discussions about key skills in higher education tend to conflate IT and information handling skills.

A different concept was introduced by the American National Academy for Science (1999), that of Fluency with Information Technology, or FITness. They argue that computer literacy has gained a connotation of being related to skills development, which is not sufficient for the rapidly changing world of technology, and does not prepare people for moving the skills they have to new applications. They have therefore sought to introduce a new concept, that of fluency, which moves beyond basic computer skills and the ability to use currently available software packages, and requires a deeper understanding and mastery of information technology, including:

- intellectual capabilities
- knowledge of the implications of technology for society
- understanding of fundamental concepts of computers and information
- skills to be able to use not only those software applications available at the time, but also to be able to adapt those skills for future developments.

Johnson & Webber (2003) argue that the UK tends to focus on IT literacy and personal skills rather than the more complex and holistic view of information literacy taken in some other countries such as the USA and Australia. They

identify that, in universities, teaching is frequently limited to one or two library skills sessions that cannot adequately address the subject.

In considering the information skills that nurses need, Shorten et al (2001) identify that the demand for safe, effective healthcare means that nurses will need to be

'information literate professionals, able to solve complex patient problems by utilizing the best available evidence' (p86)

and take a very library-centric view, focusing on 'skills necessary to become research connoisseurs' which they identify as being the skills to use various library facilities, such as catalogues, and electronic databases, and the skills to analyse the research found through them.

Although information literacy is an essential element of nursing informatics it tends to be considered the purview of healthcare librarians. In looking at who teaches information literacy in UK universities Johnson & Webber (2003) argue that academics often lack information skills and have little idea about how to teach them to students, concluding that experts in the subject should be the people to teach it. Brittain and Norris (2000) consider that there is a chasm between the traditional professional of healthcare librarianship and the newer discipline of health informatics.

One danger of there not being clarity in either the concepts of computer and information literacy, or of the relationship between them identified by Brown et al (2003) is that students with good computer skills assume that they also have good information skills.

3.2 Health and Nursing Informatics

The NHS policy and implementation documents discussed mention 'informatics skills' but do not provide one clear definition of what these are.

Some provide extremely detailed and comprehensive lists of skills or knowledge required. On the other hand the NMC and QAA requirements are quite general, and open to interpretation as to the detail of what is required.

This section reviews the various interpretations and definitions of the terms 'health informatics' and 'nursing informatics' to see how they help to inform the discussion about what it is that nurses need to know, and the context that this is developing nationally and internationally.

Health informatics is an umbrella term used to not only describe a broad discipline, but to also embrace discrete sub disciplines, such as nursing informatics and consumer health informatics. Internationally, reflecting the medicalised approach to health in some countries, there is more debate than there is in the UK around whether the main term should be medical informatics rather than health informatics. In the UK medical informaticians are traditionally clinicians registered with the General Medical Council (Hayes, 2002), although even this is changing as can be seen from the decision of the British Medical Informatics Society to change its name to the UK Health Informatics Society (Murphy 2004). The term health informatics is accepted as a more inclusive term for all people involved in health related informatics.

3.2.1 Health Informatics

Across various NHS documents different definitions of informatics are offered. Learning to Manage Health Information (NHS Executive 1999b) defines health informatics as:

'the term used to describe the science of information management in health care and its application to support clinical research, decision making and practice.' (p9)

Another definition from 1999 produced by the Northern Institute for Health Informatics is more comprehensive (NoIHI, 1999 cited NHSIA 2002c)

"...the clinical, technical, professional and organisation issues involved in the management and use of information to support patient-centred healthcare delivery. It includes activities such as clinical decision making, efficient information management, knowledge acquisition and dissemination and informed patient participation." (p3)

A few years later the DoH (2002b) defined health informatics as being:

'The knowledge, skills and tools which enable information to be collected, managed, used and shared to support the delivery of healthcare and to promote health.' (p7)

and stressed that all NHS staff need some level of competence in health informatics. It further identified that professional healthcare staff are increasingly aware that the ability to gather and use information is becoming an essential aspect of professional practice.

In the same year health informatics was still considered to be an emerging discipline by Norris (2002) who was of the view that it lacked clearly defined or fixed boundaries, but encompassed both clinical and managerial aspects of health information. He emphasised the need for professionals to have sufficient skills to use technology to support everyday tasks, such as the electronic patient record, and to make full use of knowledge management to support their clinical practice. The role of informatics in empowering patients is also acknowledged in his work as being important.

3.2.2 Nursing Informatics

One of the earliest definitions of nursing informatics was produced in the mid 1980s by Hannah (1985 p181) who defined it as being

'the use of information technologies in relation to any of the functions that are within the purview of nursing and are carried out by nurses in the performance of their duties. This comprises the care of patients, administration, education and research.'

Four years later Graves & Corcoran (1989) were much more focused on the systems aspects of nursing informatics than either Hannah (1985) or later writers. Their view of nursing informatics was that

The task of nursing informatics is to study the structuring and processing of nursing information to arrive at clinical decisions and to build systems to support and or automate that processing. (p231)

This has developed into one area of nursing informatics rather than being a view of the entirety of nursing informatics.

An American view was developed through an expert panel constituted by the National Center for Nursing Research (Pillar & Golumbic 1993) who identified seven foci of nursing informatics:

- *Using data, information, and knowledge to deliver and manage patient care,*
- *Defining and describing data and information for patient care,*
- *Acquiring and delivering knowledge from and for patient care,*
- *Investigating new technologies to create tools for patient care,*
- *Applying patient care ergonomics to the patient-nurse-machine interaction,*
- *Integrating systems for better patient care, and*
- *Evaluating the effects of nursing information systems.*

In 1996 Goossen arrived at a detailed and quite broad view of the discipline after carrying out a Delphi study of 44 informatics experts, from North America, Europe, and The Netherlands. Although still quite systems focused, possibly reflecting the nature of the technology that these experts would have been familiar with at the time the study was undertaken, it did make the link with improving the quality of nurses professional practice:

'Nursing informatics is the multidisciplinary scientific endeavor of analyzing, formalizing and modeling how nurses collect and manage data, process data into information and knowledge, make knowledge-based decisions and inferences for patient care, and use this empirical and experiential knowledge in order to broaden the scope and enhance the quality of their professional practice.'

Some twelve years after Hannah's early definition Saba (1997) considered nursing informatics to still be a new specialism under the more established health informatics umbrella. She saw a different focus, that of the use nurses

make of both information and IT to improve and support nursing knowledge and practice.

The Nursing Informatics special interest group of the International Medical Informatics Association (IMIA 1998) took a holistic approach, adding an element of supporting worldwide health, defining Nursing informatics as

'the integration of nursing, its information, and information management with information processing and communication technology, to support the health of people world wide.'

By 2001 Saba was of the view that nursing informatics had become part of a nurses' professional activity, having the role of bridging the gap between the art and the science of nursing. Staggers & Thompson (2002) agree that there are many definitions of nursing informatics, and consider that they fall into three categories. Information technology orientated; conceptually oriented; and role oriented. They are of the view that previous definitions have underplayed the role of the nurse in helping to organise information for patients. Murray (2002) does not attempt to define nursing informatics, but asserts that

'Nursing informatics is, or should be, at the heart of nursing - all nurses make use of information every second of every day - so informatics is for all nurses'

A philosophical as well as an application of nursing informatics in practice approach has been taken by Hughes (1999) who argues that whilst both knowledge and activity are central to nursing they are not equally visible, and the essence of nursing is not being recognised. This concept has also been recognised by the clinical nurse lead for the Connecting for Health Programme, Heather Teirney-Moore, (Davidson 2005) who has called the nurses role in making care work 'magic glue', invisible but essential. Ozbolt and Graves (1993) consider that reliable data about the work of the nurse is essential if the nature, effect and quality of nursing is to be recognized. The

role of nursing informatics in making nursing visible is identified by Brennan and Fitzpatrick (1992). This was also mentioned by some nurses in a study undertaken by Darbyshire (2004) who recognised that Computerised Patient Information Systems (CPIS) gave them the evidence to show how much time caring for different patients took. Other nurses in that survey however felt that the systems in use were not capable of capturing the essence of the nurse's work. This view was concurred with by nurses responding to an RCN survey (2004b)

The earliest definitions of nursing informatics are nearly 20 years old however it is still seen as an emerging discipline without any one agreed definition. Although some definitions, especially early ones focused more on the computer system than on the use of information this has developed as the technology has matured, and the health agenda has changed. The use of a computer as an information tool to support both professional development and patients is clearly considered to be part of health informatics in the 21st century

3.2.3 Patient Information / Consumer Health Informatics

One of the intentions of all the Government policies on IT in the NHS is to include patients (and where appropriate their carers) as partners in care. There are two main reasons for the need to empower patients (Welsh Assembly Government 2003). One is a perceived shift in public attitude away from acceptance of the traditional paternalistic model of health care. The other is an aim to improve quality in response to failures in health care. The Bristol Inquiry Report (Kennedy et al 2001) and the Government's response to it (DoH 2002a) are both of the opinion that the patient needs to be at the centre of care delivery, and that to make this possible patients need good quality information on their treatment and care options.

Information for Health (NHS Executive 1998) discusses that patients, and their carers, are interested in knowing more about their illnesses, including treatment and outcomes, as well as information about living with long term conditions. The strategy anticipates that healthcare professionals such as nurses will remain the primary source of information. It also expects that patients will use the Internet as an information source, and that therefore staff will need to know about variability in quality of such information, and know where to locate high quality information sources. The strategy envisages that this will be achieved through the provision of accredited information sites, such as the National Electronic Library for Health. It is not however realistic to expect patients to limit themselves to NHS approved sites for their information. Nurses therefore need the knowledge to help patients understand the quality issues involved in accessing information on the Internet.

The most recent strategy document about the implementation of IT in healthcare issued by the Welsh Assembly Government (2003), develops the patient partnership concept further, by stressing the need for a change in the relationship between patients and professionals which support the rights and responsibilities of both parties leading to an equal partnership in care. It is acknowledged that intentions of this partnership are:

- reducing 'inappropriate' access to, or requests for services,
- greater compliance to treatment regimes by patients as they become better informed of the consequences of non compliance.
- reduction in complaints as better informed patients are less likely to blame the health service if the outcomes prove to be disappointing

The shift of power within the patient / professional relationship is discussed by Hardey (1999) who, in a qualitative study of households who regularly used the Internet to locate health information, found that it is the users of the

information who decide what is accessed and how it is used, rather than the professionals they are involved with.

In a survey of Internet using doctors Potts and Wyatt (2002) found that overall the doctors considered that their patients who used the Internet experienced more benefits than problems. The provision of information and social support were the most reported benefits of the Internet for the patient. Its' value in helping patients who were experiencing debilitating diseases with limited treatment options was noted. The benefits for patients with rare conditions were also highlighted, the ability of the Internet to connect patients and experts on rare diseases was considered to be significant.

The ability of professionals to support patients is questioned by Fieschi (2002) who found that whilst patient requests for information (mainly from the Internet) have increased, caregivers are lagging behind patients in using the web as a resource. Donald (1998) however found that nurses who had received training in evidence based medicine skills used these skills to support patients' information needs.

A study by Jones et al (2001) using a four-stage multicentre multidisciplinary qualitative approach involving semi-structured interviews with clinicians in three locations, followed by a postal questionnaire and a Delphi study, found that clinicians felt they needed more education and support in several aspects of helping their patients. This included understanding the patient's information needs; helping patients to understand about health care and health care information and knowing about information sources and their use.

The rights of patients to expect, and receive, help with accessing information as well as treatment is discussed by Kemper & Mettler (2002). They state that many patients are finding information for themselves, but that the quality of

that information can be a problem. They consider that information should be an integral part of any treatment programme, with patients being provided with a 'prescription for information' tailored to their specific needs.

The Department of Health is keen to promote the concept of the informed patient, sharing responsibility for their health with the NHS rather than being passive recipients of care looking to the NHS to take responsibility for their health. The Internet is a major information source being promoted for patients, therefore nurses need the skill to assist patients who may not have the skills to locate information effectively, or to evaluate the information they do find. These activities come under the health informatics umbrella as consumer health informatics. This has been defined (Eysenbach 2000) as being

'The branch of medical informatics that analyses consumers' needs for information; studies and implements methods of making information accessible to consumers; and models and integrates consumers' preferences into medical information systems.' (p1713)

This is complementary to some of the definitions of nursing informatics which identify the need for nurses to help patients identify and meet their information needs (IMIA-NI 1998, NoEIH 1999 cited NHSIA 2002a, Saba 2001)

3.3 Nursing and Academia

Without venturing into an analysis of the history of nursing, since the early developments of 'hospitals' providing some type of care for the sick there have been people developing 'nursing'. Neither the early hospitals nor the early nurses would be recognisable as such today. Nursing in England was initially distinct from 'doctoring', as Rafferty (1996) describes, the nurse would have her own patients without the need for medical referrals. She would also have her own views on remedies and treatments and provided a comprehensive service that ranged from 'watching' (the provision of basic nursing care) through to offices for the deceased. This 19th century nursing

general practitioner was seen as a challenge to the medical authority of the day.

Nurses however have been developing along with the provision of health care, sometimes, as with Florence Nightingale, leading crucial developments to the benefit both of patients and of nursing as a profession. Florence Nightingale was an early advocate of the use of evidence in care, and used her knowledge and ability with statistics to support her arguments very effectively. In spite of her view of obedience as being 'suitable praise for a horse' obedience became to be seen as a cardinal virtue in nurses of the early 20th century. Obedience leads to conformity and according to Baly (1994) produced an unquestioning profession that became resistant to change. This view was supported by Rafferty (1996) who wrote that the training system demanded 'obedience without query' and quotes a contributor from the Nursing Record in 1888 who wrote 'the nurse soon learned never to ask "why" and as rarely as possible, "how".' Nursing had moved from being an autonomous profession, to become one that respected and did not question the seniority of the medical profession (Baly 1995, Rafferty 1996). The nurses of this era did have an information role, but it was to collect information and pass it to the doctor for interpretation and analysis. This attitude, along with low educational attainment in many trainee nurses, (Rafferty 1996) led to Florence Nightingale's lead of using information to support her care and arguments being in danger of being lost. Nursing has only recently started developing its research base, and it is arguable how information literate it is.

Nurse education only moved out of its historic home in hospitals and into the higher education sector in the early 1990s. Becher and Trowler (2001) discuss the higher education sector as being characterised by its tribes (the individual culture of academic disciplines) and their territories (the knowledge base of

the discipline). Over this same period, which coincided with the integration of Polytechnics into the University sector, the number and types of subjects, according to Becher and Trowler (2001) proliferated in British universities. This increase led to new fields of study developing, either from one discipline, or drawing on several established ones. These new fields then begin to develop their own character, and construct the philosophical and theoretical basis of the discipline. The problems faced by a new discipline are discussed by Seymour et al (2003). They found that nurses showed reluctance to fully engage with research. One reason they considered for this was that research emphasised scientific knowledge which was seen by some nurses to devalue the art of caring.

Creating a new discipline of nursing informatics was discussed by Hovenga (1998), who asserted that integration of health informatics into the established health professions, and into their education programmes, is difficult. In universities informatics can be located in a variety of faculties, including medicine, computer science, nursing, health science and informatics. Hovenga (1998) considered that this can lead to demarcation lines being drawn up, leading to a lack of mutual understanding and cooperative working.

There is a recurrent topic of discussion in nurse education, that of a theory-practice gap. This is where the classroom teaching elements of nursing programmes are not seen to reflect the needs of the nurse in practice (Henderson 2002). One important aspect of developing as a nurse happens through professional socialisation, Henderson (2002) describes this as the process of students developing their identity as a nurse, and adopting the norms and values that they see being exhibited by their nursing role models. This can lead to students rejecting their classroom learning in favour of conforming to the norms of nursing that they see in practice. Corlett (2000)

agrees with this, finding that when students felt that what they were being taught differed to what they experienced in practice their reaction was to question the credibility of the teacher, rather than the practice methods they encountered. Using Personal Construct Theory (Kelly 1955 cited Howkins & Ewens 1999) Howkins and Ewens carried out a study into how nurses become socialised into the profession. They concluded that nurses' professional socialisation is a dynamic rather than a fixed construct, that can change throughout a nurse's career.

3.4 Computer Use in Society

Widespread use of computers by non-experts is a relatively recent phenomenon. In the period 1985 to 1995 computer ownership rose from 13% to 25% of all households in Great Britain (ONS 1997) however between 1995 and 2002 this increased to 55% of households reporting computer ownership in the most recent (2002) General Household Survey (ONS 2004). Over this same period computers have moved from being a specialist piece of equipment to being an everyday commodity that can be bought in Tesco's along with the weekly shop.

Basic IT skills have been included in the national curriculum since its launch in 1998. This was further developed through the government's National Grid for Learning Initiative in 1997 (Robertson & Shortis, undated). ICT is compulsory for all school children at key stage 3 where the aim (DFES 2005) is to ensure that pupils

'acquire and apply knowledge and understanding of:

- the quality and reliability of information and how to access and combine increasing amounts of information;
- a range of increasingly complex tasks using a variety of ICT tools;
- how ICT can help their work in other subjects, developing their ability to judge when and how to use ICT and where it has limitations;
- the application and use of ICT in the outside world.'

3.5 Efficacy and Attitudes

The concept of computer efficacy has been discussed by Gardner and Rozell (2000). A key factor of the construct is that it does not focus on specific computer skills necessary for a task, but rather focuses on the application of skills to tasks. It looks forward to the expected ability to be able to carry out a task in the future rather than reflecting on the ability to have done so in the past. According to Torkzadeh and Van Dyke (2002) self-efficacy is a dynamic construct. People with high or moderate levels of self-efficacy use computers more, and persist longer in problem solving activities. Their success serves to increase their beliefs in their self-efficacy. People with low self-efficacy beliefs engage in challenging tasks less frequently and give up more easily if they encounter problems, thereby creating a self fulfilling prophecy.

Self-efficacy is also discussed by Hasan (2003) who identifies that there is a positive relationship between the users confidence in their skills and their use of computers in general rather than in the use of an individual application. People with high self-efficacy beliefs saw their skills as transferable and showed less resistance to technological change, a greater acceptance of new technologies and a better ability to acquire new skills than those with low self-efficacy. One potential danger of having a high level of self-efficacy has been discussed by Ofori and Charlton (2002) who, in looking at student nurses support seeking behaviour, found that a combination of high self efficacy and a belief that a task is easy resulted in low engagement with support in their learning.

Students with positive attitudes towards computers, as identified by agreement to two statements, 'I feel I have a positive attitude towards computers' and 'I feel that computers are helpful and useful' were found by Torkzadeh et al (1999) to experience an increase in both the extent of the

positive feeling, and in self-efficacy after computer training. Training was less effective for students with negative attitudes towards computers.

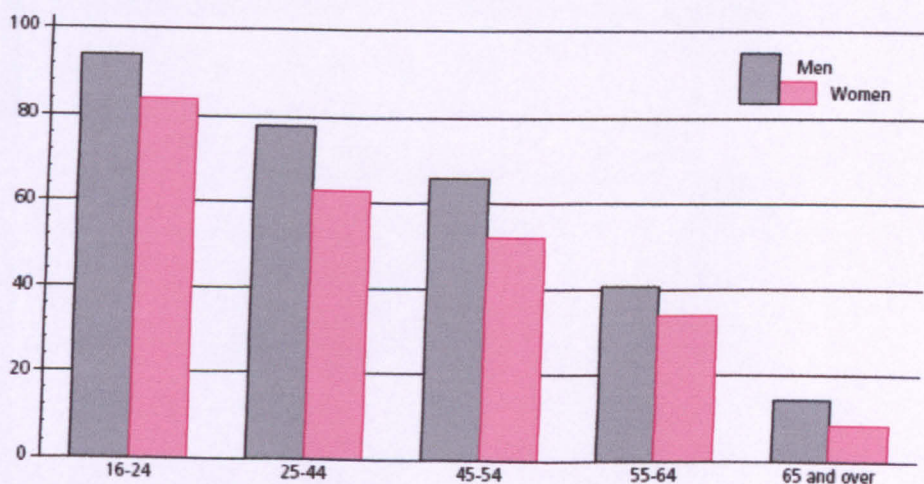
3.6 Computer Use, Anxiety and Age

The levels of computer and information skills and computer anxiety in nurses is an issue that merits comment. Some studies have found a connection between age and computer skills or anxiety. Older people in a study by Freudenthal (2001) were found to be slower and less accurate in carrying out information retrieval tasks than younger users. Zhang (2005) also found differences in a study of a group of workers, younger people thought the Internet was more useful than older participants whilst the older age groups experienced more computer anxiety. The Office for National Statistics (Matheson & Babb 2002) found a relationship between age and use of the Internet, as shown in figure 1, with younger people in their survey having a higher use of the Internet than older participants.

Use of the Internet¹: by age and gender, July 2001

Great Britain

Percentages



¹ Respondents who had ever accessed the Internet at home or elsewhere.

Source: Omnibus Survey, Office for National Statistics

Figure 1
Internet use by age and gender (Matheson & Babb 2002)

Chua et al (1999) and Beckers & Schmidt (2003) both state that there is a common perception that there is a connection between computer skills and age. Neither however found this perception to be supported in their research. Chua et al (1999) found a relationship between the amount of computer experience a user had and their attitudes to IT, with increasing use leading to less anxiety. They also postulate that computer anxiety leads to computer avoidance.

The perception of a relationship between age and computer anxiety in nurses was found to be justified in a study by Chan et al (2004) where he found that nurses over 50 had received more training than their younger colleagues but in spite of this lacked confidence and used computers less. The Royal College of Nursing (2004b) in a study of nurses' awareness of the current developments in NHS ICT expresses concern that older nurses will find it difficult to adjust to the developing use of computers in the workplace. Given the age profile of nurses if there is a relationship between age and skills or anxiety it will be relevant to this study. In 2003, the year the cohort involved in this study started their training the NMC (2004b) records the age profile of nurses in the profession as:

<25 years	2.10
25-29 years	8.54
30-39 years	29.37
40-49 years	33.26
50-54 years	11.46
>55 years	15.27

Table 2
Age profile of registered nurses (NMC 2004b, p4)

3.7 Nursing Informatics Education Requirements

3.7.1 *Why Informatics is Needed*

Whatever nurses might think about computers they are inevitably going to be a part of their workplace. The government's initiative through the National Programme is an obvious driver, and whilst it is easy to accuse the NHS of putting a lot of spin on their publicity for the programme (e.g. DoH 2005b), the principles of the majority of aims are well supported by research, and are being implemented to some extent already in many areas without the national co-ordination that the programme brings. The role of the nurse is undergoing a period of change, with nurses becoming more autonomous, taking on roles previously seen as belonging to Doctors, such as prescribing, and being more directly accountable for the quality of the care that they give.

3.7.2 *Quality and Evidence Based Care*

The ability of technology to reduce medical errors seems undisputed, from more complex systems such as decision support systems for prescribing, or at the very basic level of removing the scope for incorrectly deciphering handwriting in records (Gross 2004, Priselac 2003, Phillips 2004). Linking with this is the ability to find information about evidence based care to aid practice and improve the quality of care given. Whilst it is possible to use hard copy information, such as internal procedure guides, books or journals to achieve this it has been found (Thompson et al 2001) that ward based hard copy information is frequently unreliable, in that its source is unclear; it is out of date or it is not research based. A study looking at ways of supporting evidence based care (Donald 1998) found that if information was not available at the point of need there was a tendency for it to not be located later and concluded that, in respect of research based information, most wards were information free zones. Donald (1998) found that libraries were not regularly used by clinicians as they were generally only open during 'normal' working

hours and were not located close to ward areas. Thompson et al (2001) also found that nurses did not tend to use hospital libraries and consider that proximity to wards was a factor in this.

Online access to journals, professional information portals and other online information is the most practical way of providing up to date ward based access to the information necessary to support evidence based care. Nurses need the information literacy skills discussed in section 3.1 to support their use of these resources.

3.7.3 Electronic Systems in Practice

Computerised patient information systems (CPIS) are becoming increasingly common (Darbyshire 2004) and form a significant element of NPfIT (DoH 2002c). Indeed many hospitals and GP surgeries already have their own systems in place (Ginneken 2002). One of the advantages for nurses identified by NPfIT (DoH 2005b) is that time spent on routine administration will be reduced by the use of electronic records and electronic communication. The Nursing and Midwifery Council Code of Professional Conduct (NMC 2004a) identifies that *'Health care records are a tool of communication within the team'* (p8) and requires nurses to ensure that records of care are accurate and kept in a timely manner. Nurses have the scope to decide to delegate tasks to people who are not registered nurses but if they do so they, as the qualified nurse, remain accountable for the work, and are required to ensure that adequate supervision is given.

The code of conduct also requires nurses to protect confidential information, advising them that they *'must guard against breaches of confidentiality by protecting information from improper disclosure at all times'* (p8). Nurses therefore need not only the skills to use electronic systems but also knowledge of the information governance issues that accompany large

computerised systems. The weakest link in any computer security system has been found to be the user (Sasse et al 2001) who identify issues such as writing passwords down or sharing passwords with colleagues as frequent causes of security breaches. It is therefore important that nurses have both the knowledge and the skills to meet the NMC professional standards required.

3.7.4 Involvement in Informatics Developments

Many nurses are discontented with computerised information systems (Darbyshire 2004). The prevailing culture that he found blames this on nurses being resistant to change, or to insufficient training on systems being included. He contends however that the biggest barrier is not only that the systems do not meet nurses' needs, but that they feel powerless to influence these systems. Protti (2002) found that NHS computer users do not see the potential ways that technology could help them. Nurses therefore need sufficient knowledge of informatics to be able to at least join in the debate, if not to participate in the development of systems that meet their needs.

3.7.5 Electronic Communication and Support Systems

The drive by patients for accessing better health information has been discussed in section 3.2.3 The quality of the information available is very variable, and nurses have a responsibility to their patients to be able to support them in locating and understanding this information. A range of electronic communication mechanisms are now available, these include email, online groups for both patients and professionals, and e-learning systems. Nurses need to be able to engage with these to support their patients, and to support their own continuing education needs.

3.8 Informatics Skills Needed by Nurses

The perception found in some studies (Murphy et al 2002, Murphy et al 2004), that all nurses need are basic IT skills, is a serious under estimation of the

complex set of skills and knowledge that is needed for a nurse to work effectively and efficiently in the IT and information rich environment that is developing across all areas of society not only nursing.

The risk that as the use of IT becomes more widespread people actually know less about its use has been identified by Hasman (1998), who considers that people are satisfied with skills that are 'good enough' for the task in hand. Healthcare professionals were found to lack knowledge about both the potential and the limitations of computers systems in practice. They tended to focus on the part of the system they were using with very limited knowledge of other possible uses, or other systems available. Hasman (1998) found that although younger professionals had more experience in the use of computers this did not lead to an awareness or understanding of health informatics. This was a subject that was often not taught in pre-registration education, so new practitioners were no better informed than existing professionals.

There are bodies of academic work, discussed earlier in this chapter, exploring and defining computer skills, computer literacy and information literacy for example Corral (1998) Poynton (2005) and Saranto & Hovenga (2004). They all help to build up a picture of the skills that the modern professional computer user needs, however no one area alone captures the range of complex skills and knowledge that nurses need. These draw on and synthesise computer literacy, information literacy, nursing informatics and consumer health informatics in to a skills and knowledge base that meets multiple information needs and wants. Nurses' needs, arising from the literature review, can be grouped into the following broad areas:

3.8.1 Basic Computer Skills

The NHS has adopted the European Computer Driving Licence (ECDL) as the basic skills standard that it wishes all staff, including nurses, to reach (DoH 2001a). The full ECDL includes seven modules:

1. Concepts of Information Technology
2. Using the Computer and Managing Files
3. Word Processing
4. Spreadsheets
5. Database
6. Presentation
7. Information and Communication

The introduction of this standard was supported by the nurses' professional body, the Royal College of Nursing (RCN) who in their statement supporting the ECDL stress that it should be seen as an *'essential element of professional development and should be an integral part of performance review'*. (NHSIA 2001b p2). The need for nurses to have computer skills was highlighted in a survey of staff who had undertaken either the full or part ECDL qualification (NHS Connecting for Health 2005a). It was found that after gaining the qualification nurses reported saving an average of 30 minutes on computer related tasks per shift. This is time that can be reinvested in direct patient care. Nurses in this survey also reported an increase in problem solving ability with those saying that they 'rarely needed to ask for help' increasing from 36% to 94%.

3.8.2 Information Literacy

Whether information literacy and computer literacy are separate disciplines as argued by Corral (1998) or elements of one discipline as supported by Johnson & Eisenberg (1996) nurses need the ability to find, evaluate, understand, and communicate information in a variety of formats and to a variety of audiences. This includes other nurses, the interprofessional

workforce, and patients. Where they are working with people, who may be patients or other professionals, who do not understand the limitations of some information formats, e.g. information from the Internet, they need the skills to help those people to understand the information they have.

3.8.3 Electronic Communication

The need for efficient communication using technology is mentioned directly or indirectly in most of the standards discussed in this and the previous chapters. Email is a very popular method of electronic communication, however the Internet also provides other ways of communicating. Patient groups make use of discussion boards and chat rooms (Potts & Wyatt 2002) either with the support of professionals or independently therefore nurses need to understand and have the ability to use these systems.

3.8.4 E-learning

E-learning is placed within the informatics agenda by the NHS (DoH 2001a). One of its benefits is seen as being easily accessible for continuing professional development (CPD) (DoH 2001b). It is also developing as an important element of pre-registration education, in line with the rest of higher education as anticipated in the Dearing Report (Dearing 1997) and in The future of higher education (DfES 2003). As well as being something that nurses need to engage with for their own education and CPD needs e-learning also has role in consumer health informatics and patient education. Many of the skills needed for other uses of information and technology are complimentary to e-learning.

3.8.5 Clinical Systems

There are a variety of clinical systems currently in use, and although NPfIT is seeking to move towards common records systems this will be in the 'back office' areas necessary to support a common information spine (DoH 2002c).

Work is being done with Microsoft to produce a common look and feel to the different front-end systems (NHS Connecting for Health 2004), but in the short term there is no standard for the systems that the newly qualified nurse may encounter. They therefore need to understand the principles of clinical systems and their safe use. Ensuring that nurses can use the system chosen by their employing Trust once qualified will be an in service training requirement for the Trust and the National Programme (DoH 2002c)

3.8.6 Care Support Systems

This encompasses systems designed to deliver care, or support the delivery of care to patients. This includes a range of specific telemedicine applications and decision support systems. Knowing how to use any individual system, such as the decision support system in use by NHS Direct, is an in service training requirement for nurses involved in their use. All nurses however need to have an awareness of the types of systems available and of the professional, legal and ethical principles underpinning their use.

3.9 Skill Level Required

The level of skill, or degree of knowledge needed, is discussed in NHS informatics implementation documents (e.g. NHSIA 2001a, NHSIA 2002a NHSIA 2002c). A frequently occurring description of the skill level required is competence, the NHS (NHSIA 2002b) describe this as having 'several years experience and/or a sound understanding'

A five stage model of adult skill acquisition has been proposed (Dreyfus & Dreyfus 1986, Dreyfus 2004). Stage 1 is the Novice, who depends on a set of rules that can be applied to a set of circumstances. The second stage is the Advanced Beginner, who still needs a set of rules but works with them in a slightly more complex situation. The next stage is identified as Competence, where the learner is aware of multiple rules and possible applications, and to

cope with this develops a plan for implementing the rules in identified situations, and creates new rules to govern which plan should be adopted. It is only in this third stage of Dreyfus's model that the learner is given responsibility for determining use, rather than the rules driving the learner. Dreyfus (2004 p179) is of the view that *'in general if one seeks the safety of rules one will not get beyond competence'*. To move beyond this, into the 4th stage, Proficiency, the learner must take responsibility for successful and unsuccessful choices and application of rules, not dwelling on analyzing mistakes and insights gained, but just absorbing them. The proficient person is involved in the process rather than objectively selecting and applying rules, but lacks the experience of the expert and still has to 'think' about the rules being used. The final stage, that of the Expert, is characterised by removing the need to think about the rules and situations, relying instead on having the experience to intuitively know what the right course of action is.

3.10 Informatics Requirements in Pre-Registration Curricula

A survey of nursing students' computer competence carried out in 1993/94 (Saranto & Leino-Kilpi 1997) used a Delphi technique to gather views of various experts on what information technology knowledge a nurse needs. The results place importance on the technology including the components of the computer system, skills in computer use and use of hospital information systems. It also identified security and confidentiality as being important along with error rectification and knowing where to obtain help.

A European project looking at nursing informatics education needs, NICE, is reported by Kokol et al (1999). This project, as summarised in table 3, identified that different stakeholders in healthcare provision, nurses, physicians, informatics experts and students all held different beliefs about the use and benefits of nursing informatics.

Professional Group	Viewpoint
Nurses	Information technology can help by the documentation of care, making the care and nursing work more visible – and that's all
Physicians	Information technology can help by the documentation of health care, making the nurses more useful in the overall health care process, and at the same time reducing the routine part of the work of physicians, but a special concern should be placed on ethics, security and the division of responsibilities between nursing personal and medical personal (sic)
Informatics Experts	Information technology can help nurses in all aspects of their work including education; not only the general knowledge about information technology, but also the knowledge about computer supported medical instrumentation is needed
Students	Information technology is absolutely necessary in both education of care and performing the care

Table 3
Stakeholders' Views on IT and Nursing. (Kokal et al 1999)

Building on these views they reached a definition of the basic principles of nursing informatics education necessary to prepare nurses to work with the information supported nursing care paradigm brought about by new information technologies.

'Teaching nursing informatics is a process in which students obtain knowledge from basics of informatics and computer science, informatics in health care (i.e. medical informatics), informatics in care, midwifery and nursery (i.e. nursing informatics), computer communications (especially Internet), medical instrumentation and medical simulations via modern computer supported teaching methodologies with the aim to support real world nursing care process, making nursing work more visible and enjoyable; and finally and most important provide and enable better health for all at lower cost.' (Kokal et al 1999, p 214)

A study of computer literacy in allied health students carried out in 1999 (Patrikas 1999) also focused heavily on computer skills (e.g. the ability to format a floppy disk or create a subdirectory) and included use of various software packages (e.g. word processing, spreadsheets) and knowledge of

technical computer terms (e.g. RAM, CPU). Jones et al (2000, 2001) discuss that in spite of ample literature identifying the importance of information for patients, clinicians frequently see it as a peripheral activity. They recommend that the role of clinicians in patient information should be included in undergraduate education programmes. The ability to use IT to effectively manage information was considered to be an essential part of the basic skill set required of clinical staff by the NHS Executive (1999b).

The importance of ensuring that nursing informatics education occurs at appropriate times in the educational programme has been identified by the International Medical Informatics Association (IMIA 2000). That is when the student has sufficient clinical experience to be able to relate the skills and knowledge to practice, but not so late in the programme that they cannot put the education to use.

3.11 Nursing Informatics in Pre-Registration Curricula: The Current Position

In the late 1990s the inclusion of nursing informatics in pre-registration programmes was considered by the NHS Executive (1999b) to be opportunistic, depending heavily on the Trust where the clinical experience was gained. The NHS Executive was more optimistic about the future however, asserting that 'significant progress' had been made in building information management and IT into the curricula for healthcare professionals (including nurses) and that most programmes contained some elements of health informatics, IT training and knowledge management.

The review of Learning to Manage Health Information (NHSIA 2002a) discussed that there was still variability in the amount and nature of the informatics elements included in education programmes. It did not however support a national informatics curriculum. One issue identified was that whilst

many education programmes included elements of the skills and knowledge identified few were actually assessed.

A review of the progress made in including informatics skills in pre-registration nurse education was carried out by Murphy et al (2002) who surveyed UK medical schools and schools of nursing, midwifery and health visiting. A response rate of 43% produced 128 responses, of these 53% (n=46) were from schools of nursing. The survey found that understanding of Health Informatics was generally poor, with many respondents equating health informatics with IT skills. Learning to Manage Health Information (NHS Executive 1999b) had not been used at all in developing curricula in 38% of pre-registration nursing programmes. The amount of health informatics included in pre-registration nursing programmes varied greatly, with the median amount being 12 hours of teaching.

The question of who in nurse education is providing, or is available to provide, the expert input required to develop and support informatics education is also an issue that needs to be addressed. Hasman in 1998 identified that there was a serious shortage of professionals well trained in health informatics to contribute to education programmes. A lack of expertise amongst university staff was noted by Brittain and Norris in 2000. The situation had not improved four years later, Murphy et al (2004) state that only 11% of schools of nursing had a health informatics specialist in the teaching team. The authors pondered if the fact that IT and health informatics standards are voluntary led to a lack of 'buy in' to ensuring that health informatics was integrated into the curriculum from senior managers and educational groups.

Two research projects reviewing the implementation of the standards set out in Learning to Manage Health Information were carried out on behalf of the

NHSIA (NHSIA 2004). These concluded that health informatics standards needed to be more fully integrated into both pre and post registration training. One project concluded that there was little integrated development happening between higher education and the NHS, with both having a negative view of the clinical relevance of health informatics and technology within pre-registration programmes.

Although carrying out a full review of pre-registration curricula was outside of the scope of this study the contents of six pre-registration programme specifications were reviewed to see if this lack of inclusion still appeared to be the norm, by exploring what nursing informatics related input they included. The six selected (appendix one) were a convenience sample, in that the information was publicly available through the respective university web sites and there was a similar amount of information available on each programme. The documents were not all in the same format or style, but were either programme specification documents or student information, both containing details of the units on the programme. This level of detail was considered important to be able to see not only the unit title but also what the content of the units were. The documents were converted from their initial format (which included html and .doc formats) into pdf files, and then analysed using the advanced search function available in Adobe Acrobat Professional v7 for searching multiple documents.

None of the programmes mentioned informatics by name. Data protection as a term was not found, nor were the synonymous terms information governance or information security. Information management was searched for using the terms 'information management'; 'knowledge management' 'information skills' and IM&T, none of which yielded any results.

All the programmes required an understanding of evidence based care, however only two linked this with IT. One (programme 4) identified that that within the unit looking at evidence based care students *'will be introduced to basic IT skills for data analysis and presentation'*. The other (programme 1) included the need to develop the ability to *'Utilise and evaluate information technology supporting clinical practice'* and *'Critically examine the application of a systematic approach to the provision and evaluation of evidence based care within a variety of settings; within the same unit.*

IT was searched for using the terms IT; ICT, 'Information Technology' and 'Computer skills'. Four programmes included basic IT skills. One (programme 6), while not explicitly including basic skills anywhere in the document, identified that during the programme students would develop *'Enhanced IT skills in order to access and disseminate appropriate evidence for practice'*. Another (programme 5) made it clear that students would need to be able to use a computer to undertake the programme, but did not include any mention of IT skills development or any elements of nursing informatics in the unit information.

One programme (programme 3) was explicit in identifying the required standard of IT skills, saying that students were expected to achieve a level equivalent to ECDL modules 1,2,3,&7. The handbook also informs students that:

"By the time you are qualified, the NHS will require all employees to be IT literate. To help you meet this requirement the Faculty's e-learning strategy provides a flexible framework for students to engage in the use of new technologies and e-learning approaches to Support Learning. Therefore this programme is committed to developing student's skills in using information and communication technologies to retrieve, organise and present information."

Other than mentioning an initial Information Technology lecture and advising students that they will

'need to familiarise yourself with on-line searching and develop information technology competency to enable you to fully engage in your learning'

and reassuring them that at various times throughout the programme they will have access to workshops it was not clear how these skills were to be developed.

Only one programme reviewed (programme 1) had informatics rather than basic IT skills integrated through the programme, even though they were not identified as such. It also offered an option module 'Information for Study and Research' which included many of the information skills that underpin nursing informatics.

My own university was not included in this review as the information publicly available through the website was insufficiently detailed for inclusion. Had the same searches been carried out on the programme specification document for the adult branch the findings would have been similar to the six programmes reviewed. Nursing informatics would not have appeared as a cohesive discipline. Some mention of IT skills would have been found, but not the informatics topics searched for. This hides the fact that some nursing informatics is being delivered, dispersed throughout elements of the course.

The first year informatics theme that the cohort of student nurses who participated in this research were provided with comprised 15 two hour long sessions which introduced them to some of the skills and knowledge that they would need. This lead to the presentation of a certificate for inclusion in an assessed portfolio. An option unit 'Empowering Patients through Information' was available in the 2nd year. A third year study day focused on information governance was planned but had not been delivered by the final phase of the data collection. Details of the compulsory 1st year theme are enclosed at appendix two.

3.12 Are Nurses Ready Willing and Able?

In spite of the effort given to promoting and implementing the NHS information strategy, and on identifying the informatics needs of healthcare professionals, including nurses, the effectiveness of the effort has to be questioned.

The Bristol Inquiry (Kennedy et al 2001) found one problem was not that there was a lack of data available, but rather that '*Bristol was awash with data*' but the mindset of the staff did not include exploring what was available to review performance standards. The report stresses that all professionals need to have an understanding of the management of 'healthcare processes and organisations'. It also recommends that all healthcare professionals are given a 'good grounding' in the basic skills required by clinical audit including how to understand and interpret data and how to use published material and evidence of effective practice.

A year later a major review of the implementation of Information of Health (NHS Executive 1998) was published by Protti (2002) who noted that the emphasis was shifting away from supporting day to day clinical practice to the gathering of information for review and analysis. Notwithstanding this 'hijacking of the Information technology agenda' by the NHS, Protti (2002) considers that even with poor technology people who are motivated to make it work for them will find ways of doing so. This review was of the implementation of major structural elements of the plan, such as the electronic patient/health record rather than a review of the skills of nurses, however one of the reasons why Protti considers this may not happen is linked to poor skills and knowledge, in that the users fail to realise how the technology could help them. He also suggests that users lack the motivation to work with the system to find ways of making it work.

This view is supported by Darbyshire (2004) who found that the nurses participating in his study felt discontented with the systems they had to use. They also had very low awareness of the potentially useful information that could be obtained from a CPIS, and were not aware of how to extract information from the system. This left them feeling that they were powerless to influence the systems. Darbyshire (2004) places the focus of improving this on the design of systems that meet nurses' needs rather than just providing more training on the systems in use.

The idea that nurses are resistant to the introduction of ICT has been explored by Timmons (2003) who, in a study of 31 UK nurses found that nurses displayed informal resistance to systems which included attempts to 'put off' using them or minimising their use.

Some five years after the introduction of Information for Health (NHS Executive 1998) the government has estimated that 1 in 10 inpatients are harmed in some way by the care that they received. This is attributed, in part, to poor availability and use of information in care settings (Welsh Assembly Government 2003).

An NHS research project to implement evidence based medicine (defined in the report as 'the appropriate use of up-to-date, reliable statistical findings from research and routine data collections in clinical decision-making') into clinical settings (Donald 1998) found that whilst it was possible, and desirable, to use evidence based problem solving in clinical settings the problem achieving this was not providing access to high quality information sources. Users' lack of computer skills and poor information retrieval skills proved to be the major obstacles to the project.

Whilst the Donald study (1998) looked at clinical teams, Griffiths and Riddington (2001) found similar results in a study into how nurses made use of research databases. Use of CINALH, Medline and the Cochrane Database, all excellent reference sources for professional information, was found to be poor. The best used was CINALH, which was regularly used by only 27% of respondents. The study found that the senior staff on wards were not good role models for junior staff as they did not use the databases any more than the junior staff did.

A study into the use made of computers by practice nurses and their skills was conducted by Russell and Alpay (2000). This study found that although the majority of nurses were using computers in their work it was mainly for updating patient records, although half of the nurses did not feel comfortable with using the computer systems in their surgeries. Whilst there was an awareness of the possibility of using computers for managing information and for accessing evidence based practice information this was not being done, two thirds of the nurses reporting a lack of confidence. Although a majority of nurses expressed a desire to improve their skills they also reported that they found accessing training difficult, 81% cited lack of time as the reason for not undertaking training. Most training that had been undertaken was on specific systems (patient records systems) with minimal basic IT skills training, less than 5% of nurses in the survey having had training on word processing, using CD Roms, email or the Internet. The nurses' main source of support was from colleagues and a 'trial and error' approach to using the computer was adopted. In looking at the use of decision support information and systems by clinicians, including nurses, the authors found that there was very low awareness of decision support systems available. The most frequently programme to be 'heard of' by the participants in the survey had only been

heard of by 12% of respondents. Prodigy, a programme with a section aimed specifically at nurses had been heard of by only 7% of respondents.

A study of the information management skills of ward managers was carried out by Hughes (1999) who found that generally nurse managers lacked skills in identifying their information needs and in their use of information. The main information used was that supplied by the finance department, however nursing information and quality issues remained unaddressed.

The NHS carried out a survey of health informatics competency of various staff groups, including nurses, (NHSIA 2002b). The survey author acknowledges that there was a poor response rate, and even though they were one of the higher response groups only 223 nurses, midwives and health visitors participated in the survey. The results group these professions throughout, and it is this grouping whose results are reported here. Basic computer skills were found to be generally poor. Around half of all respondents had no skills or knowledge of common office style software other than word processing packages. Although use of email and the Internet was more widespread, 80% did not consider themselves to be competent users of these.

The importance of planned teaching strategies is discussed by Getty et al (1999) who, in a survey of 29 UK nurses' attitudes to care planning systems, found that nurses in the study wanted expert training, and did not want to be left to 'muddle through' learning the systems by themselves. The instructor, in generating a negative or positive initial experience for the nurses, was found to have a lasting effect on the nurses' attitudes to the computerised system. Only 10% of nurses participating in the survey considered that they were at least competent in identifying information needs. Slightly more,

approximately 15%, said that they were competent in obtaining information, and between 10% and 15% were competent in evaluating and interpreting information. Less than 10% said that they were at least competent in using ICT to support evidence based practice. 60% considered that they had no, or only basic, awareness of patient and public information needs. Nurses did not have the skills or knowledge required to participate in strategic IT planning or development, with 90% considering that they had no, or only basic, knowledge of these areas. 70% of respondents did not consider themselves to be competent in respect of legal and professional requirements in the use of information, with 40% saying they had no, or only a basic, knowledge of these areas.

Another study, this time of 110 student nurses (Curtis et al 2002) used a questionnaire to explore self reported skill levels and attitudes of a cohort of BSc nursing students. This survey found that although self reported skill levels were good, with 85% of respondents reporting having a moderate to high level of general computer skills, when asked what skills they would find useful on the programme 73% requested training in basic computer skills. This gap between self reported skill levels and ability was also found in study of student nurses' Internet skills (Bond 2004) which found that students' self reported skill levels did not always correspond with the tasks that they said they could carry out competently, with a significant number who considered they had at least good skills not being able to carry out basic tasks such as entering an address in a web browser.

A survey of over 6,000 Canadian nurses' use of the Internet (Estabrooks et al 2003) found that 58% had access to a computer at work, but only 5% used a work based Internet connection to locate nursing information, the majority of these (99%) used it for less than one hour a week.

An Australian study (Gosling et al 2004) looked at how nurses in 65 different hospitals used the Clinical Information Access Program (CIAP) described by the authors as

'the largest online clinical evidence service ever undertaken in Australia and internationally.... The aim (being to) encourage and support staff to use and apply evidence as part of their everyday practice' (p202)

Over 3,000 nurses returned questionnaires, and respondents were identified by the research team as Senior and Other nurses. 58% of nurses responding had heard of CIAP, and 70% of those that had heard of it used it, meaning that less than half of those responding to the survey were using this major information resource. Use by senior nurses was significantly higher than use by other nurses. Many respondents who did not use it gave lack of training as a reason. Users who had received training were found to be more effective users than those without training, being significantly more likely to report finding the information that they were looking for. One of the reasons that Gosling et al (2004) give for differing amounts of use by senior and other nurses is that ward practices do not include information seeking as part of daily nursing activities.

An online survey was undertaken in the UK reviewing nurses' awareness of, and engagement with, the National Programme. As with many online surveys the response rate is hard to determine. The report talks of sending 15,000 copies of the survey by email as well as posting it on several websites. Even if only the emailed copies are counted the response rate is very poor at 13% although it is a large survey with 2020 responses. There is a possibility, acknowledged in the report, that the nature of the distribution made it likely that the respondents are interested in IT developments and that they may not be representative of all nurses.

The results are presented in two reports. The first analyses the results quantitatively (RCN 2004a) and the second (RCN 2004b) reports a grounded theory approach to analysing the free text comments received from two open questions. The author (RCN 2004a) claims that the large number of respondents makes the findings of the survey 'highly significant' also noting that respondents to an online survey about IT are likely to have an interest in the topic. About one quarter of the respondents said that they were staff nurses. The majority of respondents (93%) considered that training is very important, however 63% had not received any training in the previous 6 months.

The qualitative analysis (RCN 2004b) found that nurses had several requirements of NPfIT. What they wanted it to provide them with was the ability to share information electronically within multi-disciplinary and multi-organisational teams. The need to be made aware of confidentiality frameworks to support this was recognised as a development need. Some respondents mentioned a lack of access to equipment as an issue. Another major requirement of the nurses in the survey was that nurses were involved in the development of systems to ensure that they meet the needs of nursing practice. A lack of training was one of the barriers most frequently raised by the respondents. Some said that they received no training and were expected to 'get on with it' others cited examples of having to undertake training in their own time as they could not be released from clinical areas.

The report found that nurses responding to the survey considered IT to be just another set of skills necessary for them to do their jobs properly, and that IT training should be part of basic nurse training, along with a requirement to keep those skills updated in the same way as other basic nurses skills such as manual handling. In talking about training the report notes that respondents

considered that this must include how IT affects patient care and clinical practice as well as basic skills.

A one year study (Morris-Docker et al 2004) into nurses' use of the Internet in clinical ward settings mainly used quantitative data from usage logs over a 12 month period to see how nurses use the Internet, and to identify their training needs. The study found that most nurses did use the Internet access provided, but use was variable across both individual staff and wards included in the study. The authors described nurses' search strategies as being unsophisticated, with basic searches in 'Ask Jeeves' and Google being the most common strategies. Searches were seldom refined, if they were it was usually by repeating the same search in a different search engine.

Professional and library databases were seldom used, and when they were used they tended to be either completed quickly or discarded. Morris-Docker et al (2004) discuss that one of the concerns about giving nurses unrestricted Internet access at the start of the study was that they might engage in *'unacceptably lengthy use of the technology at the expense of patient care activities'* (p164). The study however found that nurses used the Internet during quiet times, and for short periods only. The study concludes that staff need to be supported to develop more sophisticated search skills, including search planning and refining searches.

A study into the everyday work of nurses, and the competencies they need to cope in the workplace was carried out by Cheek & Jones (2003) who recorded the workday of 28 Australian nurses from a wide variety of clinical settings. This study found that nurses recognised an educational need in non clinical subjects such as communication skills, problem solving, lifelong learning,

information technology and information literacy, reflecting a multidimensional approach to nursing education as well as a care giving one.

A systematic review undertaken by Currell et al (2003) to assess the effects of computerised nursing record systems on nursing practice and patient outcomes found that there was evidence in one study of a negative effect of a newly introduced computerised system in documented nurse care planning and a significant relationship between the length of time nurses used computers in their work and job satisfaction. This gave rise to the suggestion that if nurses spent more time using computers at work, the satisfaction of nurses using computerised systems may improve.

A study of staff attitudes towards electronic patient records (EPR) and computer use prior to implementing an EPR system in a two UK hospitals was undertaken by Kirshbaum (2004). The Trust had previously used a patient administration system that was outdated and needed replacing. Nurses comprised 49% (n=234) of the sample. Nurses as a professional group were less likely than other groups in the study to have undertaken a computer course, with only 28% saying they had. Kirshbaum (2004) found that nurses more frequently reported being wary of using computers than other groups and made more negative statements e.g. 'I avoid using computers whenever I can' and 'I feel uncomfortable about the thought of using computers'.

In a qualitative study with six student nurses Moule (2003) found that they felt intimidated by the computer at first and that this persisted when they were faced with any new computer experience, such as being introduced to a new software package. All the students reported that their access to computers in clinical practice was limited, and that they had not been taught

how to use them. They were unclear about what the computers were used for, but wanted to know more about the use of computers in nursing.

The lack of preparedness is not just an issue for nurses. A study that started to look at capacity and capability of health communities to use health informatics effectively explored the barriers that were found (Ensor and Page 2004). This was released as a consultation document only and due to the demise of the NHSIA, where the authors were employed, the work was never finished. Private communication with the author gained permission to quote the findings being tested in the consultation document in this thesis.

The study concluded that health informatics was not on the agenda of NHS Trust executive bodies, which led to low priority being given to it throughout organisations. Ensor and Page (2004) also found that health informatics was not routinely included in staff management through appraisal, or in the recruitment process through job descriptions. This was often accompanied by a lack of health informatics awareness and competence by managers, which contributed to the low priority found. They concluded that Workforce Development Confederations (NHS education purchasers) need to ensure that health informatics education is afforded appropriate priority. They also considered engagement of clinical professionals to be essential if changes to working practices are to embed health informatics competencies in the future are to be achieved. The importance of health informatics education in professional education programmes was also stressed.

One barrier that Ensor and Page (2004) found was that within a very pressurised work life dominated by targets things that did not have targets, such as health informatics, were automatically afforded a lower priority.

Unfortunately however this does not stop things going wrong. As Donald Rumsfeld (CNN 2003) famously said,

' there are known knowns; there are things we know we know... there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns - the ones we don't know we don't know.'

In too many cases fundamental informatics knowledge seems to be in the unknown unknowns category. Losing laptop computers, along with the only copy of the data on them, is a regular occurrence (BBC 2000, BBC 2002, BBC 2003a), a new variation on this theme is storing confidential information on memory stick type highly portable storage devices. One case that received national coverage involved 13 cancer patients' records which were stored on a memory stick, this was then resold and the information accessed by the estate agent who bought the memory stick (BBC 2003b).

In 2005 an incident happened at the Melton, Rutland and Harborough Primary Care Trust (PCT) (Anon 2005) which resulted in the personal details of 92 patients who had visited a particular service being released into the public domain. This included not only the names, addresses, telephone numbers and ages of the patients, but also the condition they had sought treatment for. This was a major incident for the Trust (as well as for the patients involved). A Significant Adverse Event Report had to be submitted to the Strategic Health Authority, and the Information Commissioner's Office informed of the breach. Two patients stated that they were considering 'further action' over the incident.

The basis of the leak was found to be several individuals' failure to understand how inserting an excel chart into a word document can result in the worksheet and its contents being available from the word document. The individuals involved were self-taught, and as such secure use of the applications was an

unknown unknown. Unaware of their lack of knowledge they did not realise what they needed to know in order to be able to use the software safely. The investigation also identified a failure to use secure means to transfer data between work and home computers, and a lack of awareness of why certain IT policies were in place which lead to a lack of rigour in following them. The PCT investigation concluded that

Failure to establish a safety culture alongside a general lack of awareness regarding IT systems, policies and procedures resulted in patient identifiable information being disclosed into the public domain via a Trust Board paper'

3.13 Summary

This chapter has explored the disciplines that underpin the skills and knowledge that nurses need. These come under the umbrella of nursing informatics, but include computer and information literacy and draw on aspects of consumer health informatics. The reasons why nurses need to use nursing informatics skills were explored, taking a practice focus. The range of skills that nurses need was identified, along with the skill and knowledge level necessary to work effectively with computers in practice.

The skill levels that nurses have, and factors that might influence their skills, abilities or attitudes, such as age, growing computer use in society and the inclusion of ICT in the National Curriculum were explored. The relationship between confidence in skills, and task ability was also reviewed.

The need for nursing informatics to be included in pre-registration education was discussed. The way that it is actually included was also reviewed, and the work done by Murphy et al (2002) developed further by conducting a mini review of six pre-registration programmes to see what mention was made of nursing informatics. This found that, although elements of nursing informatics might be included within other elements of the programme they are not

mentioned in the documentation and nursing informatics is not being presented to nursing students as a discipline.

Having posed the question if nurses are 'ready willing and able' to work with IT in practice this chapter then reviewed the progress that has been made in integrating nursing informatics into pre-registration nurse education and practice since the publication of Information for Health (NHS Executive 1997). Some of the results arising from failures in informatics expertise were identified, showing how patients can ultimately be the people who can suffer when people do not 'get it right'.

The change in roles being created in education, including the changing role of the librarian and the emerging role of the nursing informatics expert were discussed. The difficulties experienced by a developing academic discipline, in an area already undergoing change with the move of nurse education from the NHS to universities, was explored. This also drew on Becher and Trowler's (2001) concept of academic tribes and territories. Discussion of the development of nursing informatics as a discipline, along with a short review of the development of nursing as a profession, provides the basis for understanding some of the reasons why nursing informatics is struggling to develop as discipline seen as a core requirement of all nurses.

The following chapter, chapter 4, explains the research philosophy and research design used in the empirical research undertaken with a cohort of nursing students, and some of the staff that support them in practice.

4 Research Methods

The question that this research set out to address is: Are nurses entering the profession ready, willing and able to utilise information and technology to support their professional practice and development? A variety of research methods could have been used to address this question. This chapter discusses the research methodology and methods that were used. It also introduces the ethical considerations of the research design.

4.1 Research Philosophy

This research is reliant on people and their actions and attitudes so qualitative methods were initially considered to be more appropriate than a quantitative approach. However some of the data collected could be dealt with quantitatively, for example demographic information and computer ownership, and valuable information could be derived from these statistics.

Some researchers argue strongly that research methods should be kept pure and that methods should not be mixed (e.g. Baker et al 1992, Leininger 1992). Others argue in favour of using a combination of methods in social research (Greene 2002) especially where the research is into complex issues (Teddle 2005). It has also been identified that using more than one method enables the researcher to balance the weaknesses of both approaches (Blaxter et al 1996, Lee 1999).

Wilson & Natale (2001) support the view that making a distinction between quantitative and qualitative methodology or methods is a barrier to effective research. When many research theorists discuss these methods and related methodologies it is as opposing paradigms (Burns & Grove 2003, Flick 2002, Field & Hole 2003, Hayes 2000). This is clearly exemplified by Denzin & Lincoln (1998) who discuss 'Qualitative Versus Quantitative Research'. Qualitative research being concerned with how reality is constructed, the

relationship between the researcher and the research, and how the situational constraints that exist shape the research that is carried out. Quantitative research on the other hand focuses on the measurement of the relationship between variables, and seeks to establish cause and effect, the research being independent of the researcher.

Rather than seeing these two methodologies (and their associated methods) as being in opposing camps I view it as continuum. At the extremes Denzin & Lincoln's (1998) distinctions hold true however life, and research, especially research into social situations (such as education and nursing) seldom occurs at the extremes. Research in these situations occurs somewhere towards the middle of this continuum, and can occur over quite a wide band rather than being fixed at a single point on it.

This view of the relationship between different research paradigms is complementary to Wilson & Natale's argument (2001). The most important aspect of research, according to Wilson & Natale (2001 p4) is the research question. The research methods used must *'flow logically and conceptually from the terminology of the question'*.

Given the complexity of the research question being asked I concur with Wilson & Natale's position and chose to design the research to incorporate aspects of different methods as this was likely to provide the maximum illumination of the subject. This locates it at the centre of the continuum, drawing on aspects from both paradigms.

One advantage of using mixed methods (Janesick 1998) is that it allows for triangulation of the results. Denzin (1989, cited Flick 2002 p226) identifies four different types of triangulation: Data triangulation; Investigator

triangulation; Theory triangulation and Methodological triangulation. This research uses two of these. Data triangulation, where data is collected at different times and from different people; and methodological triangulation, in that it is using more than one method to study a single 'problem'. The rationale for this is that it allows different facets of the research question to be illuminated by the different methods.

Triangulation has its roots in the physical sciences, whereby people can discover their position by identifying their location in relationship to at least two other, known, points. Seale (1999) considers that translating this concept into research relies on the assumption that there is a single fixed reality and that using multiple research methods will identify it. He argues for a different understanding of triangulation in research, that of identifying multiple realities, using triangulation for the revelation of difference.

This research is concerned with trying to understand what is happening in a complex situation in the real world, and it is unlikely that there is one reality that explains it. Seale's (1999) use of triangulation is a helpful concept, this research is interested in identifying different individual's and staff groups' reality, and in bringing these together better understand the issue.

Greene et al (1989) argue that the benefits of using mixed methods extends beyond this, identifying five purposes of mixed methods studies, of which triangulation is just one. Two others that Greene et al discuss, complementarity and expansion, are significant features in this research. The intention being that looking at the question in different ways helps to develop a greater understanding than can be achieved by a single method.

The longitudinal nature of this study also created the potential for another benefit identified by Green et al (1989), development, to be used through the study. Earlier stages of the research could suggest a direction or area of questioning for inclusion in later stages of the research.

Creswell (2003) offers advice on choosing a strategy for using mixed methods, identifying four decisions that the researcher needs to make. The first decision he identifies is that of the implementation of the methods, the order in which the methods will be used. Creswell argues that the intent of the researcher should drive the ordering.

The data collection in this research was initially quantitative; reflecting that the students had little experience of the course to explore in the early stages of the research, therefore the emphasis was on establishing computer use, skills and attitudes. As the students gained experience the methods moved to qualitative techniques to allow a more in depth exploration of their experiences.

The second question posed by Creswell (2003) is that of the priority given to each approach. Creswell asserts that the interests of the researcher, the audience for the study, and the aims of the study drive this priority. The approach of prioritising in this study is that all the data gathered is of equal priority. Factual aspects of the data collected, such as age and incidence of computer ownership; student perception of their computer skills; and their attitudes towards computer use are explored using descriptive statistics, whilst the more explanatory material gathered from group interviews is used to help understand the practice experience of the students.

In considering any research Morgan (1986) argues that the evaluation will depend on the viewpoint of the person undertaking the analysis. This will inevitably be true in this research, my biases and interests as a lecturer leading teaching in this area cannot be excluded totally from the approach to the subject, nor the way the questions are selected and asked. I however adopted the approach of Mills (cited Crompton & Jones, 1988): *'I have tried to be objective, I do not claim to be detached.'*

The third question that Creswell (2003) asks is when the integration, or mixing, of the different types of data collected happens. Several opportunities are suggested; the collection of the data, the analysis stage, the interpretation of the results, or a combination of places with Creswell proposing that this may be driven by the sequencing of the data collection. This is also discussed by Greene et al (2001) who propose two methods of staging the elements of mixed method research. One is an integrated design, where there are planned points of integration throughout the study making an interactive blended and iterative process. The other is a coordinated design with the main mixing of the methods occurring at the end of the research process, when the inferences and conclusions are developed, with the findings from the parts of the study being reported separately, one set of findings being used to illuminate or refine the other.

This research drew on elements from both Greene et al's (2001) model, and the combination option identified by Creswell (2003). The data collected in the first two phases of the research was quantitative. In the final phase quantitative and qualitative data was collected from the students, and was used interactively in the group interviews held with qualified nurses. The data collected was further integrated at the end of the study in the analysis rather than being reported separately.

Tashakkori & Teddlie (1998) make the point that mixed methods refers to both the methods used to collect the data, and to the way the data is analysed. They also consider that using mixed methods is too limited and propose a paradigm of mixed model research, where the mixing goes beyond the research methods used to include other aspects of the research.

- I. The type of investigation - exploratory or confirmatory
- II. The type of data collection and operations - quantitative or qualitative
- III. The type of analysis and inference - qualitative or statistical

In principle this is the philosophy adopted in this research design, however the model proposed is too rigid for this research. It is however valuable in focusing on the aim of the research, which is exploratory in that it is seeking to provide understanding of a situation.

Having decided that a mixed methods model was the best design to answer the research question the research was designed as a longitudinal study. In order to establish how well equipped students are to work with information and technology in a professional capacity when they start the course, and what influences their development of this ability through their education it was decided that following a cohort of students through their course was the best way of meeting this aim.

4.2 Research Design

Data collection was organised in three phases, illustrated in figure 2 overleaf. The first phase being to establish the students' skills and attitudes to information technology, and their skills in using computer applications at the start of their nursing course. The second phase was to explore their approaches to gathering information, and was carried out at the end of the first term, after they had had to carry out research for their first assignment of the course. The final phase investigated their use of information and

technology in practice and was undertaken two years into their course and explored their use of computers both for academic purposes and in their practice experience.

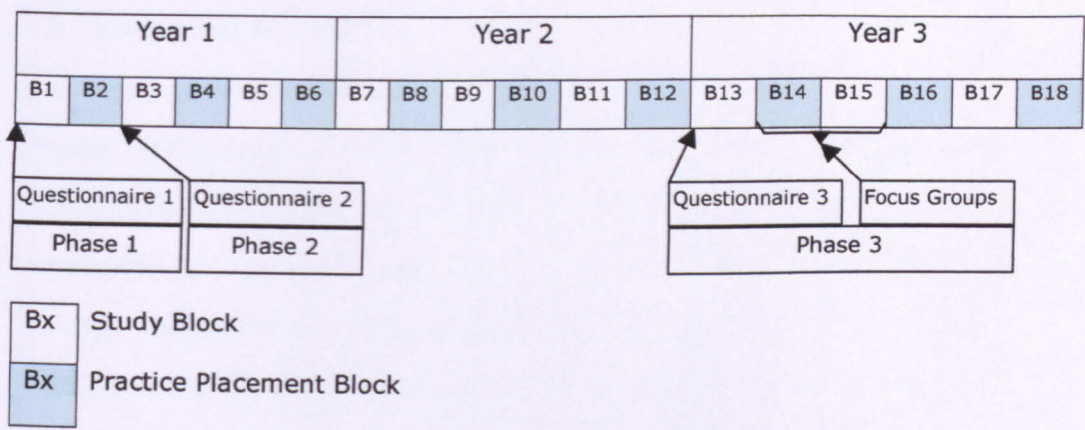


Figure 2
Diagram of Study Timetable

The first two phases were questionnaire based. The third included a questionnaire and group interviews. One problem that has been found with questionnaires is that the response rate can be poor, Arber (2001) suggests that 60% is a reasonable expectation for self completion questionnaires. Oppenheim, (1992) however asserts that group administered questionnaires, which are presented to the respondents by someone who is then available to clarify questions and later collect the forms, can expect a high response rate. The distribution of these questionnaires was therefore done in an administered way, as discussed for each questionnaire in more detail in section 4.4, to maximise the response rate.

The term questionnaire is used to describe a set of questions given to a respondent for self-completion (Newell 1993). Questions can be designed to collect a variety of data. They can either be open, giving the respondent the freedom to answer as they wish, or closed, where a limited range of

responses are presented for the respondent to select an answer from. Yates (2004) identifies four different types of closed questions that can be used:

- Direct questions (e.g. age);
- Two way questions (e.g. yes/no or a little / a lot);
- Multiple choice questions
- Scale questions, often using a Likert scale.

Proctor (2001) expands on the Likert scale, explaining that Rensis Likert developed a system of ordinal scaling for attitude measurement which asks participants to respond to a statement on a scale from strongly agree to strongly disagree. This type of monotonic scale is, according to Proctor (2001) now the most common method used for measuring attitudes. The design of each of the questionnaires used in this study is discussed in more detail in section 4.4.

The third phase of the study included group interviews with qualified staff in placement areas to explore the use the students' role models made of computers to support their work and professional development. A group interview has been defined by Green & Thorogood (2004) as '*an interview in which the researcher simultaneously gathers data from more than one participant*'. Green & Thorogood (2004) assert that in much of the literature any group interview is called a focus group. They draw a distinction between different types of group interview, reserving the term focus group for a group of people, previously unknown to each other, brought together in a formal setting to discuss a topic. One of the key aspects of a group interview identified by Green & Thorogood (2004) being that as well as collecting data they also show how people interact with each other. The need to situate participants' responses within the group context is stressed as an important consideration in the group interview situation.

Characteristics of different types of group interview have been classified by Coreil (1995) and are shown in table 4 below. Within this classification two different types of group interview were used as part of this study. The nature of the group interviews is discussed further in section 4.4.3.

Interview Type	Features	Typical Uses
Consensus panel	Often composed of key informants or experts Seeks group consensus or normative reactions More narrow, closed ended stimulus material	Agreeing clinical protocols, resource prioritisation
Focus Group	Participants selected to meet sampling criteria Seeks broad range of ideas of open ended topic Formal, controlled pre-arranged time and place Usually audio-taped and transcribed for analysis	Testing health promotion materials, Exploring service users' views
Natural group	Group exists independently of the research study Format formal or informal Interview guide loosely followed Usually recorded by written notes	Ethnographic data collection (informal), social research (formal)
Community Interview	Open to all or large segments of a community Usually recorded by written notes	Project planning Programme evaluation

Table 4
Typology of Group Interviews (Coreil 1995)

4.3 Ethical Considerations

All researchers have an ethical responsibility to people participating in their research. Bournemouth University Research Ethics Policy and Procedures (Bournemouth University 2003 p8) states that

In all circumstances, researchers must consider the ethical implications of their research and the physiological, psychological,

social, political and economic consequences of it for the participants. Every effort must be made to assure the protection of Research participants against physical, mental, emotional or social injury. No harm must come to them as a result of being involved in the study.

These were the overarching considerations in designing this research. The potential for harm did not, in reality, exist. However, due to the relationship between the researcher and the participants, the perception of potential harm did require serious consideration. The intention was that I would not teach this cohort of students, although, with the longitudinal nature of the study and limited staff to cover this teaching, it could not be guaranteed over the whole period. In the event this aim was met. The students may well have thought that as the research was being carried out by a senior lecturer who could, at some stage, teach them on their course that their participation or otherwise could damage, or indeed benefit, them on the course.

The research ethics policy identifies researching with students as a particular problem area:

Considerable care should be taken where consent is sought from those in a dependent position and it should be made clear that refusal to participate will not lead to any adverse consequences. For example, students must be assured that any decision not to participate will not prejudice, in any way, their academic progress. (p11)

Offering anonymity was not possible as in order to be able to follow the students throughout the study it was necessary to be able to link responses and students through the three phases of the study. Each student was therefore allocated a number which was used on the questionnaires distributed. Students' names, numbers and responses never appeared together. All coding and analysis of the information was carried out by number so that individual students could not be identified. In keeping with the requirements of the Bournemouth University Research Ethics Policy and Procedures (2003) this system was explained to the students, and they were

assured that the only time names and numbers would be linked was in the distribution of questionnaires.

Students were assured at all stages of the data collection that their participation was not compulsory and that they could decline to participate without it having any effect on their progress on the course. The first two questionnaires were distributed within the first term of the course, when students may have been most willing to participate because of lack of confidence, concern about the effects of not doing so, or a general keenness to be seen as a 'good' student. Although this early in the course there had been no opportunity to establish a professional relationship with the students I explained the taught doctorate that this research was being done for as well as the actual research and the overwhelming response was an interest in the research, some degree of relief at the realisation that their lecturer was a student as well and might therefore understand the pressures they were facing and a willingness to participate.

The questionnaires were collected back by the students passing them along to the end of the row. Some chose to fold the questionnaire in half so that their answers were not visible. This meant that it was not possible to see if questionnaires had been completed or not.

Due to the numbers and timetables it was not possible to give out all the questionnaires personally, and some were given out on my behalf by other members of the teaching team. They were briefed about the instructions and introduction that needed to be given about the research to ensure that all groups received the same information. There was no difference in reaction or willingness to participate across the groups.

The third questionnaire was given out two years after the first questionnaire, so the students were reminded about the research, and the questionnaire distributed and collected in the same way as the first two.

Participants in the group interviews were selected opportunistically because of other events they were attending. The person organising the session was asked if they were happy for me to ask their group to participate. The nurses attending the session were then given an outline of what I wanted to discuss and why. They were assured that there was no obligation to participate, and that their decision would not affect the event they were attending.

Participants were told that the information would be given anonymously. No names were taken and the event not identified in case they felt this would mean that their identity would be revealed through the combination of event, staff type and comment.

Consideration was also given to legal requirements, such as those of the Data Protection Act. The results were analysed using a computer programme (SPSS), but no personal information was recorded in the database, beyond the identification number. Participants were advised that the information supplied would be held in a database in this way.

4.4 Data Collection

4.4.1 Phase 1.

The first phase was carried out in the first week of the course. The aim of phase one was to establish the students' skills and attitudes to information technology, and their skills in using key applications on starting their nursing course. This was done by means of a questionnaire (enclosed at appendix three). This had three sections, asking about computer ownership, self

perceived skill levels, ability to carry out some basic computer tasks, and demographic information. Considering the NHS and RCN's support for the ECDL as the standard of basic skills that nurses should have the ECDL syllabus (ECDL 2002) was used to inform the computer tasks included in the questionnaire. Careful consideration was given to the style of the questions and a mix used according to the information being collected.

Closed questions were used for gathering factual information, e.g. age group and computer ownership, where the answers were limited in option, and needed to be grouped accurately for analysis.

The skills section relied on the student's perception of their skills and abilities. This was not an objective way of gathering this information. One way of judging skills accurately would have been to set the students a formal test. This option was discounted for ethical reasons. The students had only just started the course and to ask them to give time to sit a test of limited benefit to them was not thought to be ethical. In sitting the test students who were already lacking in confidence may have felt that their perceptions of their ability were confirmed and have felt demoralised, and students who thought their ability was good but found themselves unable to perform 'well' may have had their confidence dented. It may also therefore have contributed to developing, or worsening, computer anxiety in the students, this could have had a negative effect on their educational experience. Students' perceptions of their skills were considered to be as important a consideration as their actual skills. Given these considerations the lack of objectivity was acknowledged, but accepted as being the best way of gathering the information for this study.

The attitude section of the questionnaire was based on a Likert scale. Four options were given, without a neutral choice, to encourage participants to make a decision on the answer rather than remain neutral. Where questions related to specific computer experience a further category was included for students who had no experience to base an answer on, so that this could be taken into account in the analysis. For example when asking students to indicate their agreement with the statement 'I like to work with computers' anyone who had never tried using one to know if they like it or not could chose the 'never used' option rather than miss the question out. The questionnaire was piloted with students from the previous intake, and small changes made to ensure clarity.

The questionnaire was distributed to adult nursing students at the start of their first informatics session, which occurred in the first week of the course. I, or one of the teaching team, explained the research and was available to answer any questions that the students had. There were 284 students registered, and as this session was when students were issued with their computer logins and other essential information a high turnout was anticipated. This was therefore considered to be the most efficient way of reaching the maximum possible number of students. 244 students, 86% of the total number of students in the cohort, attended the first session and were given a questionnaire, which all of these students completed and returned.

4.4.2 Phase 2.

Phase two was conducted at the end of the students' first term at university. The intention of the second questionnaire (enclosed at appendix four) was to explore the students' information seeking techniques. All the questions in this questionnaire were closed questions because of the factual nature of the information being sought. At the end of the first term students submitted their

first assignment, which required them to find out about lay and professional definitions of health. The questionnaire asked them about the information sources (electronic and hard copy) that they had used. This assignment was selected as the most appropriate to base the questionnaire on for two reasons. Firstly was the timing of the assignment, which came quickly after sessions in *Informatics and Library skills* introducing the students to online information. They should therefore have been in a good position to be aware of, and able to use, the various information sources available. Secondly the topic of the assignment meant that it would have been very appropriate to use a wide variety of online information sources.

In case students were also carrying out research for other assignments or course work and using different techniques a section of the questionnaire asked about information sources used elsewhere on the course. The questionnaire also asked about their preferences for finding information about a social activity; making travel arrangements, booking tickets and checking the weather for a day out.

Piloting this questionnaire was done with a small group of colleagues. Ideally it would have been piloted with students who had done the assignment, however this was the first cohort to do this particular assignment so there were no students from earlier years who could be approached. Asking students from the research cohort would have meant excluding them from the project at this stage. It was not ideal using a different type of person to pilot the questionnaire however it was considered to be the best option available. Small changes to the list of available options were made as a response to feedback on the pilot version.

This questionnaire was distributed in timetabled class sessions, in the same way as the first questionnaire. As with the first questionnaire there was 100% participation amongst students invited to complete the questionnaire.

Attendance at these sessions however was not as good as when the first questionnaire was distributed. Even with a second round of questionnaire distribution in the following week's session only 55% of the intake (135 students) completed the second questionnaire.

4.4.3 Phase 3.

The final phase of data collection was carried out early in the 3rd year of the course, this was the students' final year of the course. Information was again gathered using a questionnaire, enclosed at appendix five. The same identification coding scheme was used to ensure that the information collected could be linked to responses in the earlier two questionnaires. The questionnaire was piloted with nurses involved in the student's practice education to ensure that the terminology used was correct. The comments received back resulted in the questionnaire being simplified before being distributed to the students.

The first section of the questionnaire used closed questions to ask about the information sources used in assignments at the end of the second year (the most recent that the students had done). This was included to see if there was a change in information seeking practice since the 2nd questionnaire, completed 20 months previously. Students were also asked about their information seeking in respect of information to support their clinical practice.

The second section asked about experience on placement. Students' placement experience is planned individually, so the range of experience varies enormously across the cohort. Broadly the placements can fall into three types:

- Continuing care, generally in a private sector nursing home
- Acute care, in a hospital setting (NHS or sometimes private)
- Community care, may be in a variety of settings, but generally linked to a GP surgery

The IT provision is not the same across each of these placement types, nor is it the same at different establishments within each placement type. The aim of this section being to build a picture of how IT is being used in placement locations generally, and by the students specifically.

Where there were a limited number of possible factual answers closed questions were used to ensure consistency and allow coding of the answers.

Closed questions could not however allow exploration of the students experience in any depth, therefore open questions were included as well.

These were used to ask students to expand on an answer to a closed question, or to describe their experience in their own words.

Students were asked if they would be willing to participate in focus groups or individual interviews to explore this further, however the number responding positively to this invitation, and including working contact details, was too small to be able to pursue this activity.

Group interviews were arranged with qualified nurses who were involved in the students' placement education experience. These all fell into Coreil's (1995) classification of natural groups, as all the groups were already formed for other purposes. One also had some of the characteristics of a consensus panel as the participants were chosen as having a senior position within their workplaces. This was not sufficient in itself to make them experts in the use of IT in practice but did confer on them a 'key informant' status. The aim was not to seek consensus, but to see if a consensus arose from the group discussion. In preference to using Coreil's classification (1995) this group is

called the natural/key informant group as this better reflects the characteristics of this group.

Green & Thorogood (2004) explain that natural groups can be formally constituted, or can be informal, that is they can be found fortuitously during fieldwork. In the case of the group interviews held in this study they were informal, in that I had no control over who would be in the group, and were planned opportunistically. I did not want to invite nurses to participate, as this was likely to result in only nurses with a particular interest volunteering. Nurses who were attending an activity relating to their role as mentors or nurse educators were therefore approached.

Three groups interviews were held. One with senior nurses, each with a different specialist role, and two with general 'ward' based nurses, one group from an acute hospital setting and one with nurses working in the care home sector. This latter group also included one senior nurse working in that sector. All the nurses participating were from clinical areas that provide students with practice placements.

In all the interviews a semi-structured approach was adopted. There was a schedule of topics to explore, but participants were encouraged to talk freely, and if they introduced new issues or interpretations that were relevant to the research they were encouraged to discuss them.

The natural/key informant group interview with the senior nurses was planned as being more structured than the two natural group interviews with ward staff. This reflected their broader experience across a range of placement settings, and of working with staff across these settings. The questions started by asking if the participants thought nurses needed to be able to use

computers, and if so what for. They were then asked to think if they did anything in addition to these tasks to identify not only how they were using IT in the workplace, but to explore if they thought that they were typical of nurses they worked with. Given their broad knowledge of working practices across several practice areas some of the information given by the students in the open question section of questionnaire three was shared with them to explore if it sounded credible in their experience. To protect confidentiality this was shared anonymously and the practice area the comment related to was not identified.

As the ward nurses had more limited experience and did not have experience of practice outside of their clinical area the questions asked in these two group interviews were aimed at exploring just their own experiences. The interview schedule started with asking about how they were using computers in their work, and then moved on to discuss attitudes to computers.

The sessions were planned to take around half an hour. The group interview with senior nurses took almost an hour. The two with ward based nurses were shorter than planned, the second group lasting 15 minutes and the third twenty. As suggested by Coriel (1995) the natural/key informant group interview was taped and transcribed later whilst notes were taken of the two natural group discussions.

4.5 Data Analysis

The data gathered from the questionnaires was input into SPSS (version 12), using the student coding to allow tracking across all three phases of the research. Where students had not completed all questionnaires the information from each individual was still entered, but the complete data set

for that student was excluded from any analysis across the all the stages of the research.

The data was subjected to descriptive analysis, frequencies and crosstabulations to build a picture of the students' use of information and technology. As the data collected was predominately nominal or ordinal non-parametric statistics, i.e. Chi-square, was used to identify statistical significance in the crosstabulations.

In analysing the open questions in the third questionnaire the comments were entered into Microsoft Word verbatim. This allowed them to be read, and words or phrases that were repeated across answers identified both by visual scanning and by the use of the Word 'find' function. These were then highlighted and colour coded according to the emerging themes. This process was repeated until all comments had either been located within a theme, or identified as not fitting into any theme. Verbatim quotes from students were included in the presentation of results where doing so would not carry any risk of identifying the individual student.

The information gathered from the group interviews was not subjected to thematic analysis. The comments were accepted as individual experience and opinions, and used to help expand, understand, confirm or otherwise illuminate the earlier data collected.

Integration of the data was started with the group interviews. The answers to the questionnaires were used to inform the framework for the interviews, and the senior staff interviewed were invited to respond to comments from students to see if a different perspective was offered.

Data collected from each part of the research was analysed individually, then an integrated analysis was undertaken, exploring the relationship between the information collected at each stage.

4.6 Summary

In creating this research design the underpinning research philosophy leant towards a humanistic paradigm, in that a complex social situation was being explored and the aim of the research was to better understand what was happening, and the underlying factors, rather than to define cause and effect with certainty. The design of this research has adopted Wilson & Natale's (2001) principle, that the most important consideration in research design is the research question.

A cohort of students was followed through their pre-registration course. Data was collected through questionnaires in three phases. The first two were in the first year of their course, the final phase was at the start of the final (third) year of the course. Group interviews were also held with some of the qualified nurses who support students in practice, allowing for different perspectives to be included.

5 Results, Phases 1 and 2

This chapter, and chapter 6, present the findings from each phase of the research. The analysis of the data collected in the later phases of the research draws on the results from earlier phases to allow integration of the data and themes and linkages to be identified.

This chapter presents the results of the first two phases of data collection, undertaken in the first year of the students' course. In section 5.1 students experiences of, and attitudes towards, computing prior to the start of the course are presented. Students' use of information for academic purposes at the end of their first term is explored in section 5.2.

5.1 Questionnaire 1

5.1.1 Background to Questionnaire One

The first questionnaire collected data about students' use of computers prior to starting the course. There were three sections, the first asking about ownership and use, the second about self rated skill levels and ability to carry out some basic computing tasks, and the third about attitudes. Some personal information, e.g. gender and age, was also collected.

A total of 244 questionnaires were distributed and completed in phase one. There was a 100% response rate for questionnaires given out. However whilst the distribution method was intended to reach as many of the intake as possible only 86% of the total cohort were actually present in the session to be given questionnaires to complete.

5.1.2 Demographic Information

In keeping with the typical student profile of the course, the majority of the students, 92% (n=224) were female with just 8% (n=20) male. The age

spread was quite wide, the majority of students (58%, n=142) being aged 18-25, a further 19% (n=47) being 26-35 and 23% (n=55) over 35.

5.1.3 Computer Ownership and Internet Connection

Computer ownership was high, with 80% (n=194) reporting having a computer at home all year round. A further 11% (n=27) had access for part of the year, mainly at home addresses (9%, n=23). Only 9% (n=23) of students reported not having any home computer access. It is likely that these findings are related to the fact that the majority of mature students live at home, rather than in university or hospital accommodation.

Over three quarters of those with computer access at home also had an Internet connection all year (76%, n=146), a further 9% (n=17) had Internet access from their home computer for part of the year, all from home rather than term time addresses. Only 16% (n=30) of students with some computer access did not have any Internet access. There is an age factor in having an Internet connection, most likely for the same reasons as for computer ownership. Older students tend to live at home while undertaking the course. Younger students are more likely to live in hospital accommodation where it can be difficult to arrange the phone line necessary for an Internet connection.

More than half of all respondents 66% (n=147) also had their own email account. The 35+ age group report the highest ownership of an email address with 86% (n=43) reportedly having one, compared to 61% (n=79) of 18-25 year olds, and 60% (n=25) of 26-35 year olds ($\chi^2=11.313$. df=2 p<0.005).

5.1.4 Use of, and Attitudes Towards, Computers

Having a computer is however only part of the picture. The use students make of their computers, and attitudes to computers are also important

considerations. As well as questions about use there were several questions asking about students confidence in using, and attitudes to, computers. These asked students to say if they strongly agreed, agreed, disagreed or strongly disagreed to several statements including:

- 'I would need a lot of support if I have to use a computer on this course'
- 'I struggle if the computer doesn't do exactly what I expect it to do'
- 'I only use a computer if I really have to'
- 'I enjoy exploring new things to do with a computer'
- 'I like working with a computer'

The responses to these questions are summarised in figure 3 below. 64% (n=153) agreed with the statement that they struggle if the computer doesn't do as expected, a quite common occurrence in computer use. 32% (n=76) agreed that they would need a lot of support to use a computer on the course.

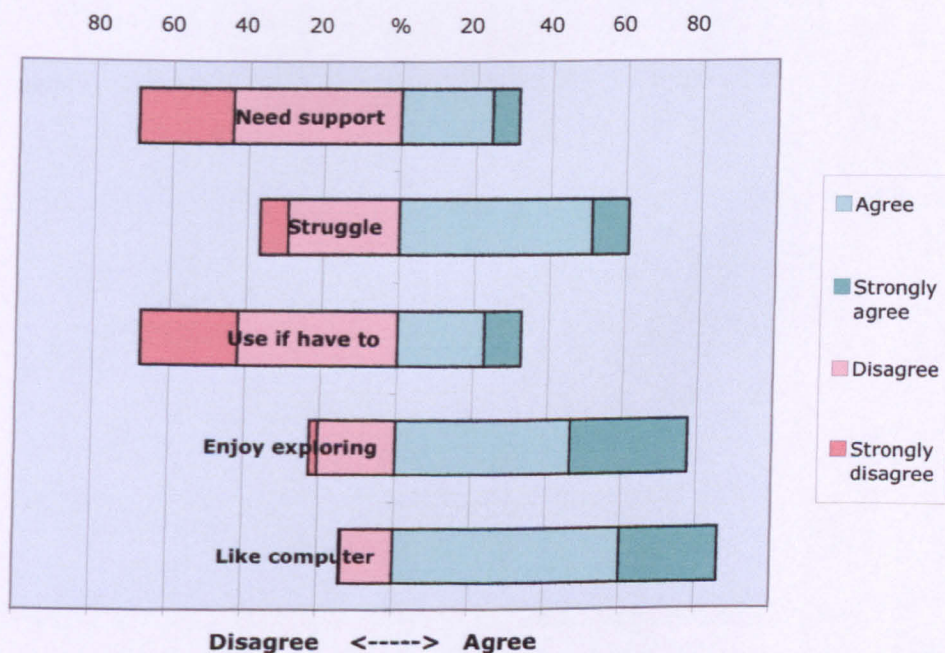


Figure 3
Responses to attitude to computers statements (n=236 - 241)

25% (n=48) of respondents said that they both liked computers and only used them if they had to. 29% (n=69) reported that they struggle with the computer if it doesn't do what they expect, and also consider that they will need a lot of support if they are to use a computer on the course.

The only responses that showed a clear age relationship were 'I only use a computer if I have to' ($\chi^2=10.539$, $df=2$, $p<0.005$) and 'I would need a lot of support if I have to use a computer on this course' ($\chi^2=15.888$, $df=2$, $p<0.001$). Older students agreed with both statements more than younger students, as can be seen in figure 4 below.

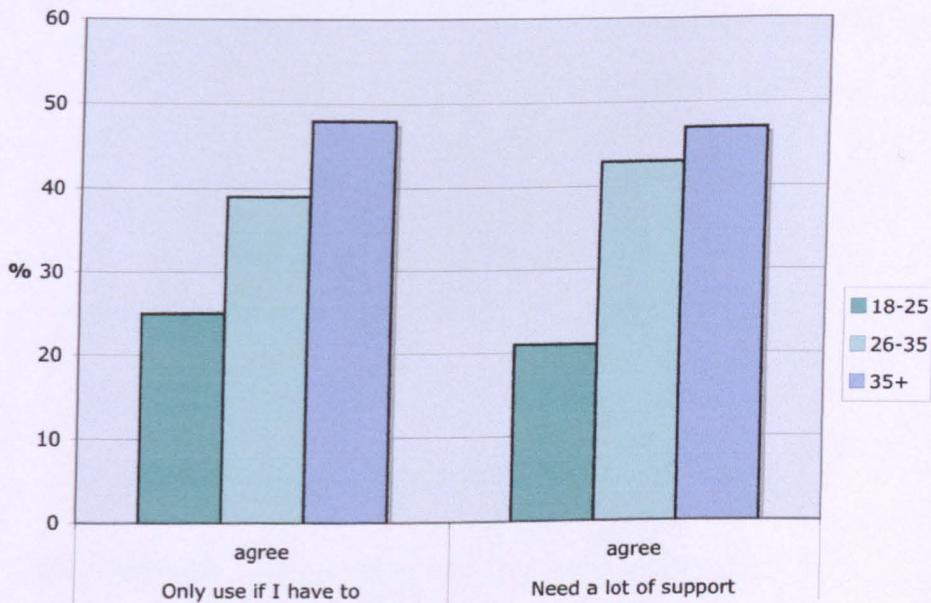


Figure 4
Age and students confidence in using computers (n= 236 - 243)

Students were also asked about their attitudes towards computers and nursing, again using a likert type scale. Most (86% n=209) reported that they liked working with a computer, and almost the same amount (86% n=208) that they were looking forward to using computers on the course. Students thought that computers were essential for nurses and useful for patients, 98% (n=233) of respondents agreed that 'The Internet is a good source of public

information about health related issues’ and 99% (n=238) agreed that ‘Health care professionals in the future will have to be able to use a computer’.

Students were asked about their use of a number of popular software applications. Presentation packages, graphics and artwork, and spreadsheets were the least used applications (figure 5 below). There was no significant gender or age relationship found with the programmes used.

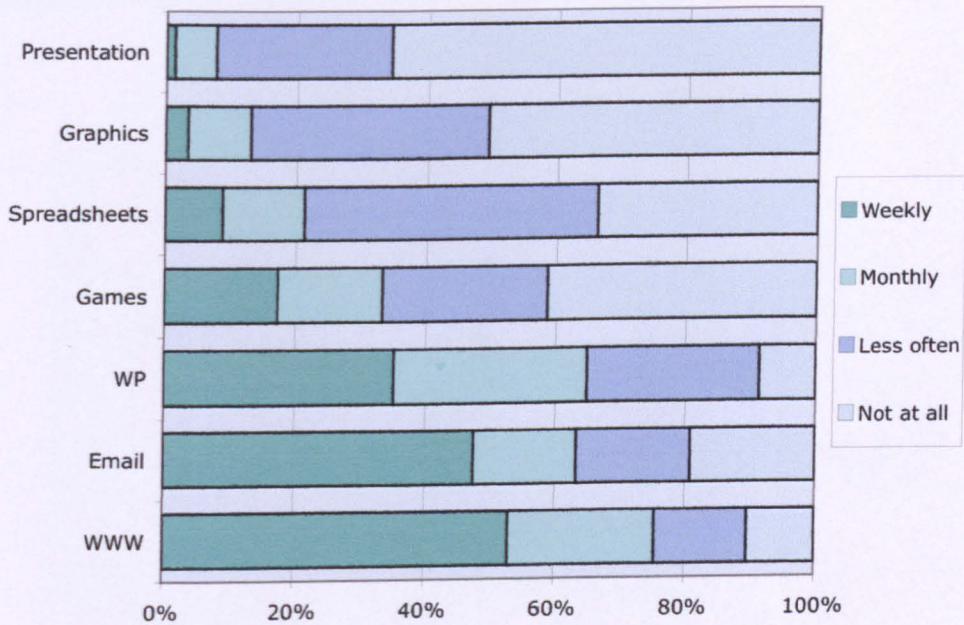


Figure 5
Software use in previous 3 months (n= 242 – 236)

The most frequently used applications were Internet based, with 53% (n=127) saying they used the Web at least weekly, and 48% (n=114) using email weekly. A relationship was found between use of the Web and email, 89% (n=100) of students who used the Web weekly also used email at least weekly. 80% (n=20) of those who had not used the Web in the previous 3 months had not used email either ($\chi^2=193.312$, $df=9$, $p<0.001$). There was no relationship found between use of the Internet and the student’s age.

Students were asked to respond to the statements that they ‘often use’ online discussion, messenger and email services. Internet services other than the

www and email, e.g. online discussions or instant messaging were not used frequently, as shown in figure 6 below. 90% (n= 207) of respondents said that they did not often use message boards, of these 43% (n=90) said that they had never tried. A similar response was obtained when students were asked if they often used instant messaging services such as MSN Messenger or ICQ, 79% (n=181) did not agree that they often used them, and 52% (n=94) of these said that they had never tried using them.

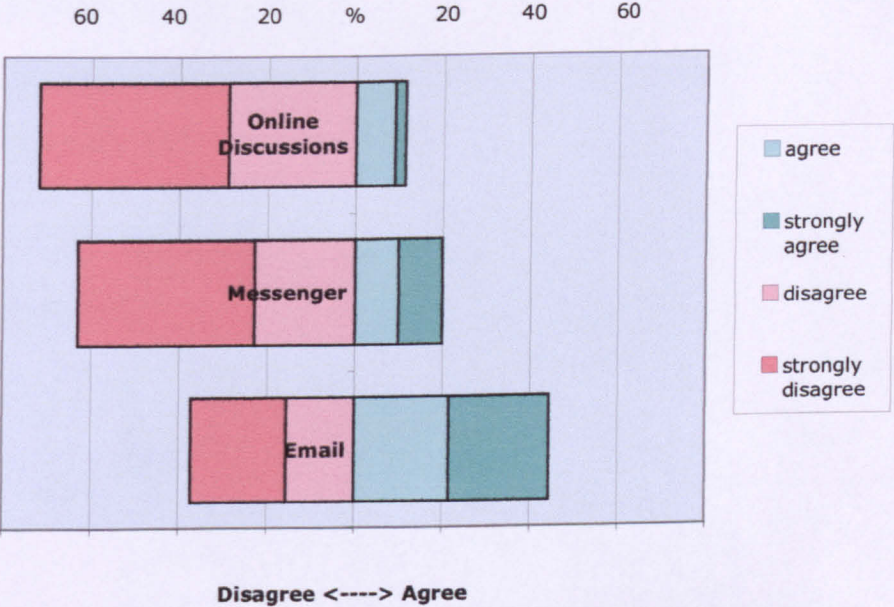


Figure 6
Online services often used (n=224)

Students were asked about the search tools that they used. 9% (n=21) of students said that they had never used the Internet and this group were excluded from the calculations. Students were asked if they used basic or advanced search options. Evidence suggests that students may not know what they are doing as 36% (no=76) did not know which they used. 53% (n=112) said that they used basic search options. Only 12% (n=25) said that they used advanced search options.

This information was crosstabulated with responses to the statement 'I end up with far too much irrelevant information when I try to find things on the WWW'. Students who used advanced search options were significantly less likely to agree with this statement than either other group ($\chi^2=8.846$, $df=2$, $p<0.05$). Only 32% ($n=8$) of advanced option users agreed with the statement, compared to 59% ($n=65$) of those who used basic search options and 67% ($n=50$) of those who said that they did not know which they used.

5.1.5 Students' Skills Levels

Students were asked about their perceived skills levels in using common software applications (figure 7 below)

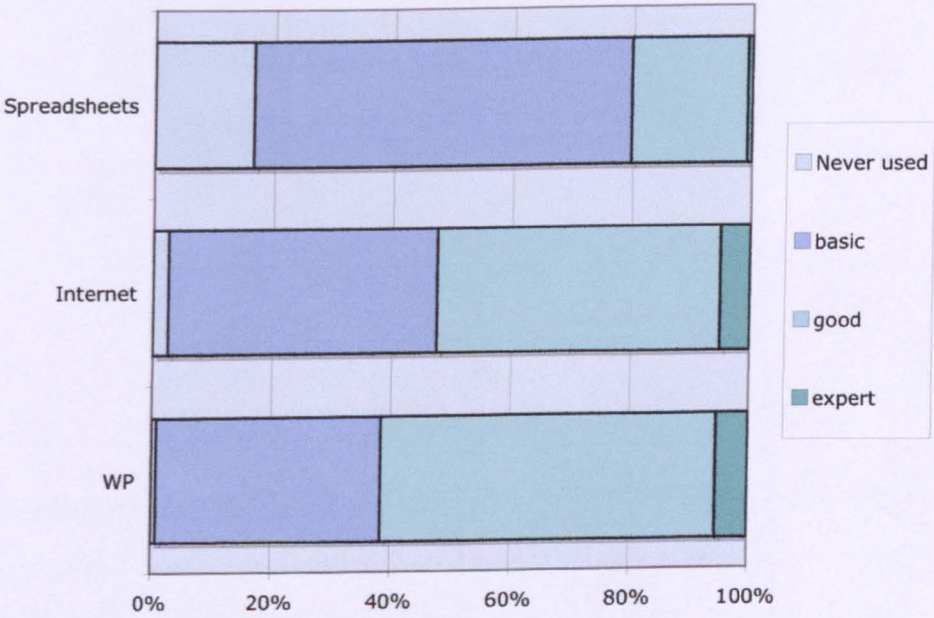


Figure 7
Students' reported skill level with various type of software

The results show that students' perceptions of their skills did not always meet the standards set by formal skills assessment protocols. In asking about Internet skills there were six Internet related questions, three about the Web and three about email, where students were asked to say if they could carry out the task without any problems. In the attitude section there was a further

Internet related question for students to indicate their agreement with the statement 'I end up with far too much irrelevant information when I try to find things on the WWW'. Student perceptions of their skill levels, (expert, good or basic) crosstabulated with the tasks they stated they could carry out without problems are shown below in figure 8.

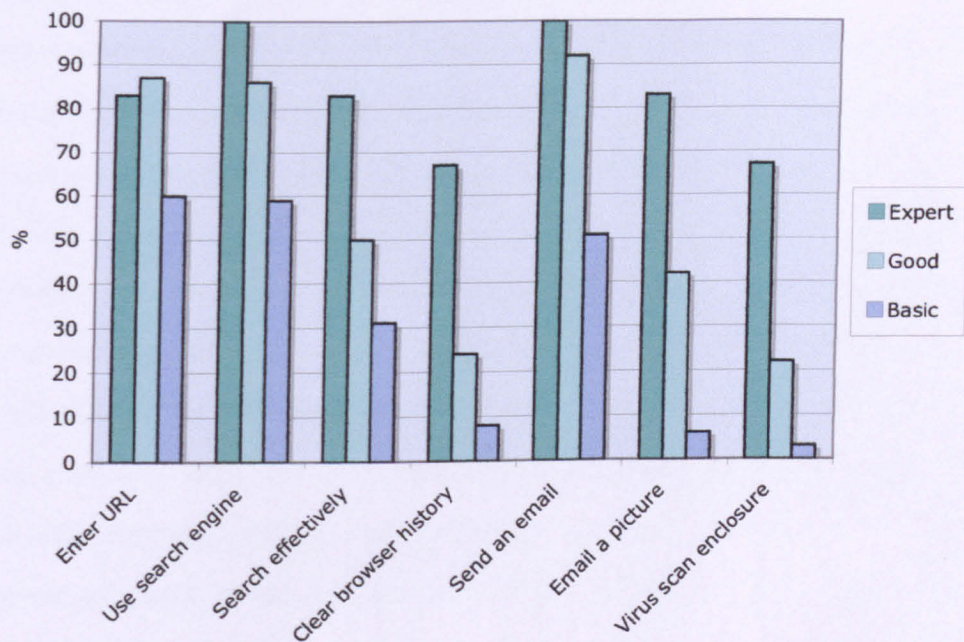


Figure 8
Task ability and perception of skills (n=231 – 236)

Crosstabulation of students’ stated ability to carry out Internet related tasks and their self perception of skill levels was carried out, with chi-square used to measure the strength of relationship between the two. This was found to be at least $p<0.001$ for all of the results shown in figure 8. (See appendix six for details of these results.). 13% (n=17) of those students who reported that they had good or expert Internet skills reportedly could not enter a web address in a browser, and barely a quarter (26%, n=33) said they could run a virus check on an email attachment. 23% (n=41) reported that they could carry all three Web related tasks, and 15% (n=26) all the email tasks. Just over half of all students who said they could use a search engine to find

information with no problems (53%, n=92) also said that they end up with far too much information when they search the Internet ($\chi^2=16.346$, $df=2$, $p<0.001$).

This gap between perceived ability and use suggests a lack of awareness that was equally apparent for students' assessment of their skills on other software packages. Only 1% (n=2) of respondents said that they had never used a word processing package. Of the 240 students who said that they had used a word processor 5% (n=13) considered themselves to be expert, 56% (n=136) to have good skills and 37% (n=91) to have basic skills. Nearly all students (96% n=230) reported that they could word process a simple letter. Of the students who reported their skills to be expert or good 15% (n=35) reported that they could not insert a page number into a footer ($\chi^2=45.021$, $df=2$, $p<0.001$) and 21% (n=51) reported that they could not insert a table into a document ($\chi^2=43.219$, $df=2$, $p<0.001$). Less than half of all respondents (42%, n=97) reported being able to carry out all three tasks.

Spreadsheets were the least used application according to the students' responses, with 16% (n=40) of students saying they had never used a spreadsheet package. Only 15% (n=20) reported being able to carry out all three spreadsheet tasks included in the questionnaire. Only 1% (n=2) of the 202 students who had used a spreadsheet reported their skill levels to be expert, a further 19% (n=47) good, and 63% (n=153) basic. The very low number in the expert category made statistical analysis unreliable. As all the tasks students were questioned about are included in the basic ECDL, students who consider their skills to be good or expert should be able to carry out these tasks according to this measure. Expert and good were therefore recoded into a new category of 'at least good' reported skills which overcame this problem. Nearly all spreadsheet users, 94% (n=46), could enter

numbers into a spreadsheet ($\chi^2=21.974$, $df=1$, $p<0.001$). Of the students who reported their skills to be at least good over a quarter (27% $n=13$) could not enter a formula ($\chi^2=45.903$, $df=1$, $p<0.001$) and almost two thirds (65% $n=32$) could not move a worksheet within a workbook ($\chi^2=27.472$, $df=1$, $p<0.001$).

Analysis of students' perceptions of their skills, and their ability to carry out some tasks associated with that skill level have shown that students are not very good at assessing their skill levels. Notwithstanding that students' own perception of their skills rather than any 'grading' based on the tasks they said they could complete has been used in the analysis of the questionnaires. The rationale for this is that even if the self-assessment of skills does not stand the test of scrutiny it is the skill level that students feel they have, and therefore it is a relevant factor in their decisions about computer use.

5.1.6 Classifications of Computer Use and Skills

In order to look for patterns of use that may be related to future use of computers and the Internet students' use was classified in two ways, frequency of use and perceived skills.

Students who reported using at least 2 different packages on a weekly basis were classified as weekly users, this was nearly half of all respondents, 47% ($n=114$).

The www and email were the packages reported as being the most frequently used, as shown in figure 9 overleaf. The www was reportedly used weekly by 52% ($n=127$) of all respondents and email by 47% ($n=114$). 42% ($n=100$) reported using both at least once a week. When looking just at respondents classed as weekly users this increased significantly, 96% ($n=108$) reported

using the www weekly, ($\chi^2=158.123$, $df=1$, $p<0.001$) and 91% ($n=103$) email ($\chi^2=163.309$, $df=1$, $p<0.001$). The next most popular package was Word Processing, reportedly being used weekly by 35% ($n=85$) of all users, and by 67% ($n=76$) of weekly users ($\chi^2=98.630$, $df=3$, $p<0.001$). No relationship with either age or gender and weekly use was found.

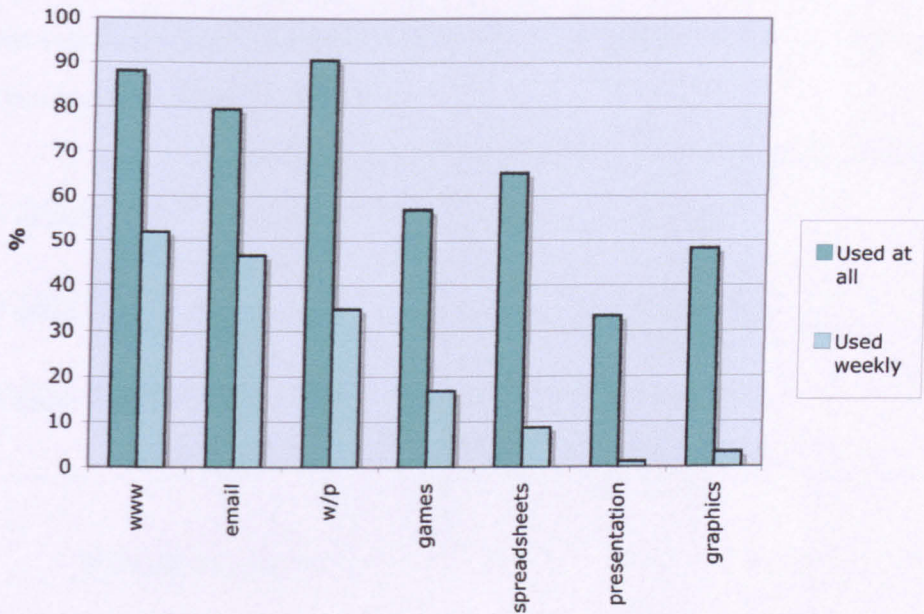


Figure 9
Frequency of use of software applications ($n=244$)

A relationship was found between students who struggled with problems and weekly use. 51% ($n=57$) of weekly users agreed that they struggled if the computer didn't do what they expected it to, compared to 74% ($n=96$) of less frequent users ($\chi^2=14.313$, $df=1$, $p<0.001$). Weekly users also reported more confidence in their ability to cope, only 20% ($n=23$) of weekly users agreed with the statement that they would need a lot of support to use computers on the course, compared to 41% ($n=53$) of less frequent users ($\chi^2=12.310$, $df=1$, $p<0.001$). No relationship was found between frequency of use and students age.

A separate classification matrix was derived from students' perceptions of their skills. The classification was based on Internet and Word Processing skills as few students considered themselves to be either good or expert at using spreadsheets (23% n=49). In total 62% (n=149) of students considered themselves to be expert (5%) or good (57%) at word processing. Slightly fewer, 54% (n=127) considered themselves to be expert (5%) or good (49%) at using the Internet. Students' abilities were classified according to the grid in Table 5.

	Internet Expert	Internet Good	Internet Basic/never use
WP expert	Very good n=2	Very good n=9	Good n=2
WP good	Very good n=8	Good n=89	Moderate n=38
WP basic / never use	Good n=2	Moderate n=17	Weak n=67

Table 5
Skills classification based on students' perceptions (n=234)

As can be seen in table 6 below few students were classified as having very good skills. The largest group were those classified as having good skills. More students were classified as having weak than moderate skills.

Classification	Number	%
Very good	19	8
Good	93	40
Moderate	55	24
Weak	67	29

Table 6
Skill Classification, group sizes (n=234)

There was a relationship between students reported use and perceived skill levels, as can be seen in figure 10 overleaf. Of the 20 students classified as having very good skills, 17 (85%) were also weekly users. This proportion

steadily decreased, only 17% of the 74 students classified as having weak skills, were also weekly users. ($\chi^2=46.986$, $df=3$, $p<0.001$)

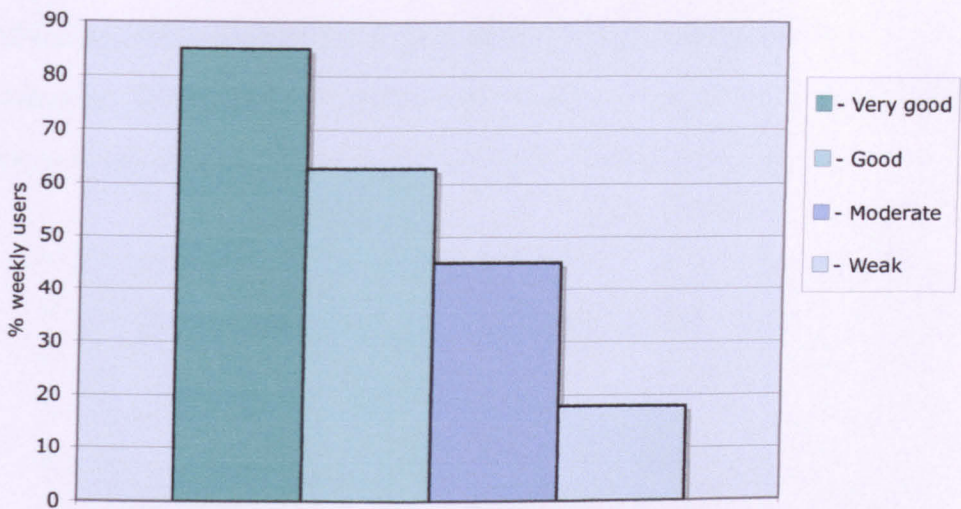


Figure 10
Skills and Use classifications (n=242)

There was a difference in reported confidence in skill levels between older and younger students ($\chi^2=21.227$, $df=6$, $p<0.01$) with younger students reporting better skill levels than older ones as shown in figure 11 below.

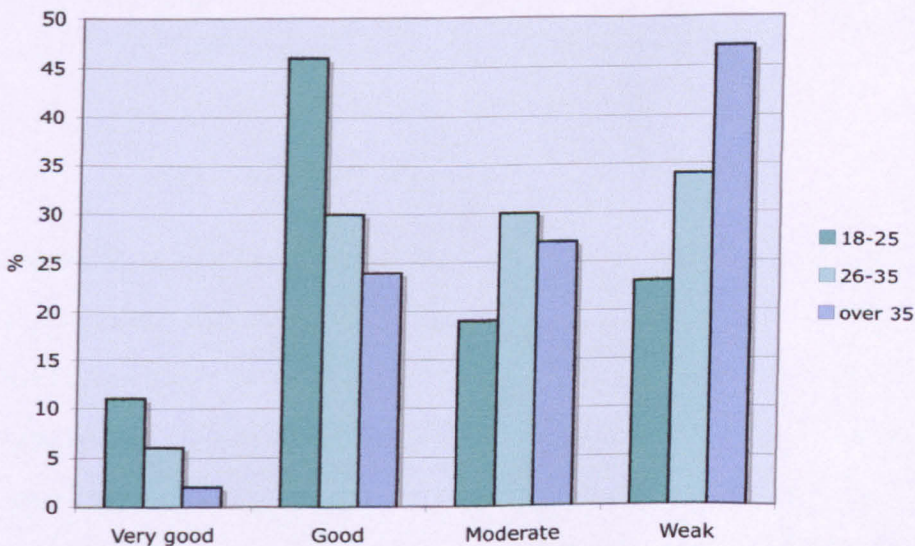


Figure 11
Age and confidence in skills (n=242)

When reported ability to carry out tasks was cross-tabulated with the age of the students there was a suggestion of a relationship with the younger students reporting more ability to carry out tasks than older students (figure 12 below). However, this was only a statistically significant relationship in two instances: 'Insert Table in a word processor' ($\chi^2=11.226$, $df=2$, $p<0.01$) and 'Enter a web address in a browser' ($\chi^2=13.405$, $df=2$, $p<0.001$)

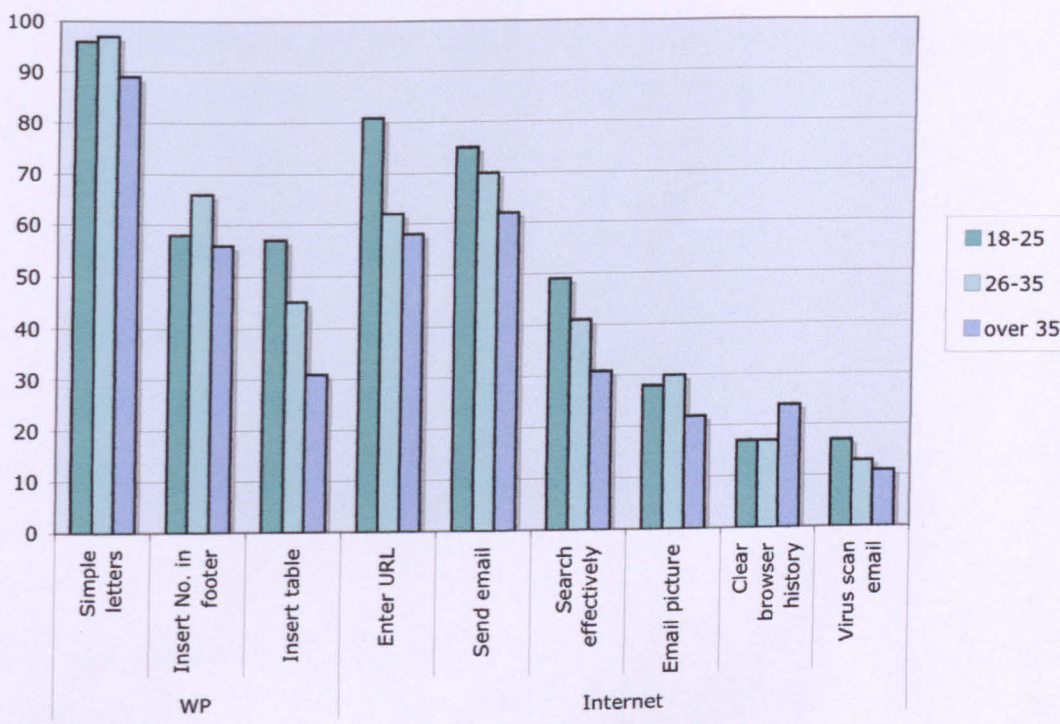


Figure 12
Age and ability to carry out tasks (n=232 - 244)

Relationships were found between students' skill level classification and their responses in the attitude section of the questionnaire, shown in figure 13 overleaf. Skill level classification was related to greater agreement to liking computers, ($\chi^2=59.010$, $df=3$, $p<0.001$); to struggling if the computer didn't do what they expected ($\chi^2 68.539$, $df 3$, $p<0.001$) and to needing support ($\chi^2=67.061$, $df=3$, $p<0.001$). The greater the skills level the more positive and confident the students reported being. This also however shows an underlying lack of perception of necessary skills, 21% (n=4) of students classified, from

their own perception of their skills, as having very good skills, and 40% (n=37) as having good skills also agreed that they struggled if the computer didn't do as they expected.

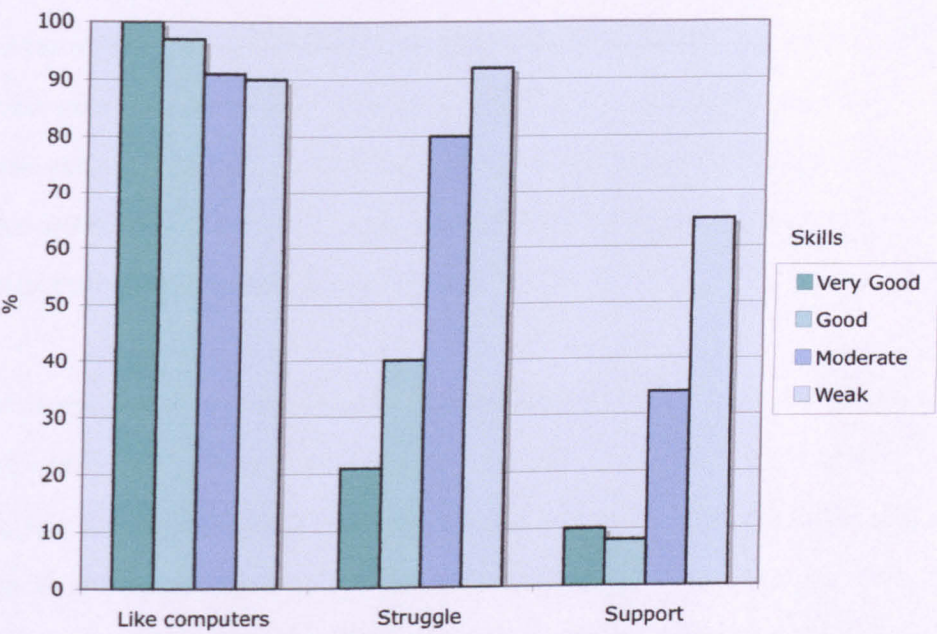


Figure 13
Skills and attitudes (n= 240 – 242)

5.2 Questionnaire 1 Results Summary

The initial questionnaire was intended to 'set the scene' by finding out if, and how, students had been using computers before the start of the course and their attitudes towards IT.

The data collected shows a student body keen to work with computers during their course, and who consider them to be an important tool for nurses, and capable of providing useful information for patients.

Students were asked to rate their skill level according to a simple scale: Expert, Good or Basic. They were also given a range of tasks and asked to indicate if they considered that they could do them without any problems.

Skills were also explored in some statements the attitude section. The results from these suggest that the students judged their skill levels by their ability to do the things they needed to do, rather than with any appreciation of external standards. Students tended to over report their skill levels when compared to the tasks that they reported they could carry out. Students self reported skill levels were used to classify them as having very good; good, moderate or weak skills. Around one third of students classified as having very good or good skills, agreed with the statement that they 'struggle if the computer doesn't do exactly what I expect it to do'.

Use of computers appears to be unsophisticated, basic features of common packages being the most used. The majority of students reported not being able to use more advanced (although still basic by ECDL standards) functions, such as virus checking emails. The results suggest that sometimes students did not know what they were doing; when asked about Internet searching one third reported not knowing if they used basic or advanced search options.

Although no significant difference in age and ability to carry out tasks was found a significant relationship between students self reported skill levels and age was found. This suggests that the difference is actually in confidence in skills rather than in actual skills.

Two factors arose from the results, frequency of use and perceived skills, and for each a classification was designed for use in later stages of the research to explore their influence in the students developing use of computers.

5.3 Questionnaire Two

5.3.1 Background to Questionnaire Two

135 students completed the phase 2 questionnaire, this was 55% of the 244 who completed phase 1 questionnaire. There were no significant differences in computer ownership, prior use of the Internet, Internet skills and attitudes, skills classification or weekly use between the students who completed just the first questionnaire and those who completed both. The first section of the second questionnaire asked about use of online information sources for recreational purposes, and the second section about use for academic purposes.

5.3.2 Recreational use of Online Information Sources

Students were asked which information sources they would use for three planning tasks: checking the train timetable; checking the three day weather forecast; and booking the tickets for a day out. The results are shown in figure 14 below.

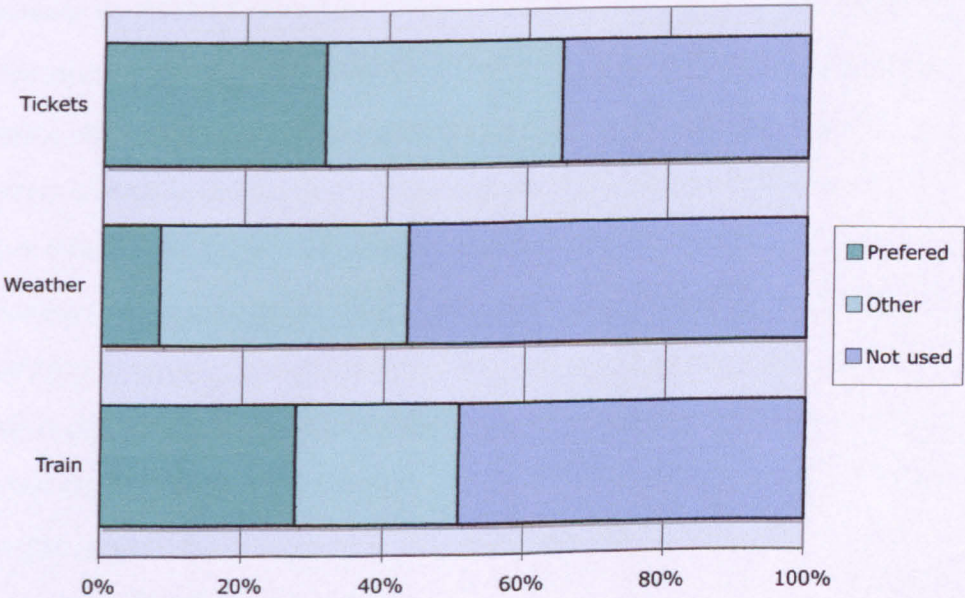


Figure 14
Use of Internet for recreational tasks (n=134)

There was little movement between questions with non-users in one question tending to stay as non-users in the other two.

The answers to this section were used to classify students as having a strong, mild or no tendency to use online sources. Students who selected an online choice as their preferred option for at least one of the three tasks were classified as having a strong tendency to use online information sources; those who used an online choice as a secondary information source at least once as having a mild tendency, and those who did not select any online information options were classified as having no tendency. Less than half of the respondents, 44% (n=59) had a strong tendency to use online information sources. A further 30% (n=40) had a mild tendency and 26% (n=35) had no tendency to use online sources.

5.3.3 Academic Uses of Information

The second section of the questionnaire asked students about the information sources they had used when undertaking a recent assignment, for clarity in discussions these information uses are referred to as assignment information. The assignment required students to define health from both a professional and a lay viewpoint. Students could have identified a different range of information sources to support their research for each part of the answer to this assignment. Official information sources, such as NHS publications and journals, would be ideal for identifying a professional definition, whilst for lay definitions magazines or health related charities could be most suitable, although journals can also be a good source of this type of information. All students have access to both print and online journals, had received training in their access and use, and had access to help if they had problems using any academic information source.

In answering the questions students were given a variety of options for where they located the required information. In analysing the answers responses to some options were combined in coding. Books, newspapers, magazines and printed journals were combined to 'hard copy'; Department of Health or NHS and Charity web sites were coded together as 'known web sites'. E-journals, search engines/directories and health gateways were initially coded individually, however in response to the very low numbers of students using some of these options a new variable of 'e-user' was created, and used if any of these online options were selected.

The main information source that students used for the assignment was books or other hard copy information sources. When looking for professional definitions this was the preferred choice for 94% (n=123) of students. For lay definitions this was slightly lower at 89% (n=105) of respondents. Only 2% (n=3) of respondents used any online source as their preferred choice for professional definitions, 2% (n=2) preferred an online source for lay definitions.

Online sources were much more likely to be used as secondary information sources. 63% (n=82) of students used at least one online choice for professional definitions, whilst 49% (n=63) used at least one for lay definitions. 32% (n=41) of the students did not use an online option for either definition. The range of online sources used was limited, with web sites (37% n=28) and search tools (28% n=21) proving the most popular as shown in figure 15 overleaf. E-journals were used less frequently (21% n=16) and very little use was made of subject gateways, which were only used by 5% (n=4) of students.

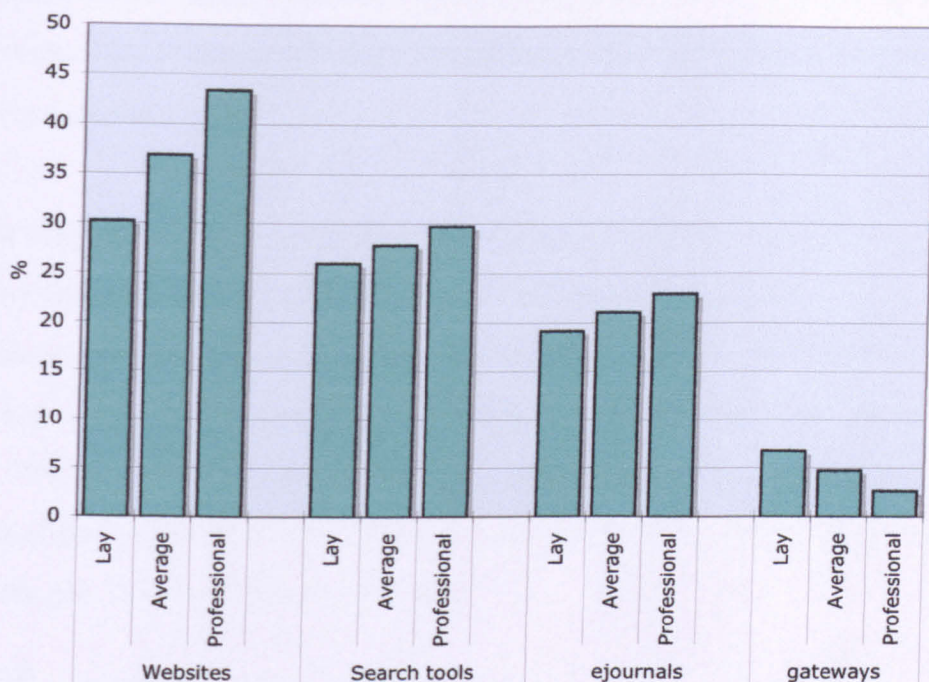


Figure 15
Use of online sources for assignment (n=73-74)

78% (n=46) of students with a strong tendency to use online information sources recreationally also used at least one online source as either a preferred or secondary information source for their assignment. This fell to 62% (n=24) for those with a mild tendency, and to 59% (n=19) for those with no tendency. Statistical analysis (chi-square) however showed that these were independent variables.

In the final section students were asked about the information sources they had used during the course, without any specific purpose identified. To differentiate this information from the assignment information this category of information is referred to as academic information. Respondents were asked to say if they had used books from the library; research databases (e.g. BNI, Medline, CINAHL) printed journals in the library; online journals from university computers; online journals from a home computer and search engine/directory. Whilst the split between location of use for e-journals is of

interest from a management perspective it is not relevant to this research, and therefore in coding the use of e-journals from both home and university were coded to e-journal user.

The most popular academic information source for students, as shown in figure 16, was books, used by 99% (n=132) of all respondents. Only one student said they had not used a book during the course. The next most popular information source was search engines/directories which were used by 77% (n=102) of students. Print journals were slightly more popular than e-journals, with 57% (n=76) using print, and 50% (n=67) using e-journals whilst just 44% (n=59) used databases.

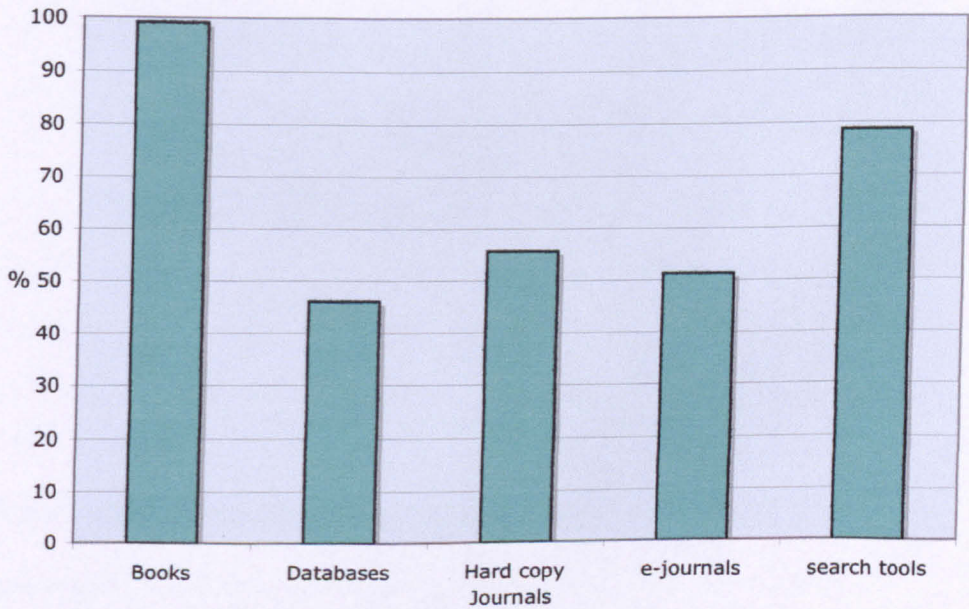


Figure 16
Academic Information sources used (n=113)

As shown in figure 17 (overleaf) students reported using search tools and e-journals slightly more for professional definitions in their assignments than for lay definitions, and much more for general academic use than for use in the specific assignment asked about. Only 12% (n=9) reported using e-journals for all three purposes, whilst 48% (n=35) said that they did not use them at

all. Just over one quarter (26% n=19) said that they did use e-journals in their academic work, but did not report any use of them for the assignment in question. A similar pattern was found with search tools. 19% (n=14) reported using a search tool for all three purposes, 23% (n=17) did not use one for any purpose, and 43% (n=30) whilst saying that they used them in their academic work did not report using one for either assignment task.

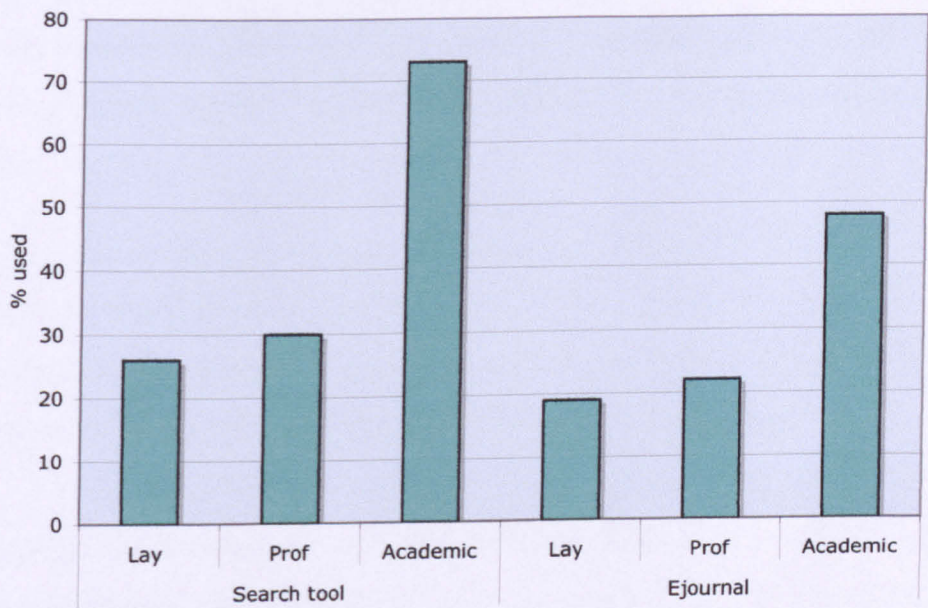


Figure 17
Use of online information sources (n=73-75)

5.3.4 Use Classifications, Recreational and Academic use

There was little relationship found between weekly users as identified in questionnaire 1, and use of online information sources for recreational use. The only relationship was with using the Internet to check the weather, when weekly users were more likely to use an online information source than less frequent users. 16% (n=7) of the 45 weekly users said that the Internet was their preferred choice, and 42% (n=19) a secondary choice, compared to 5% (n=4) of the 89 less frequent users giving it as a first choice, and 32% (n=28) a secondary choice. ($\chi^2=7.951$, $df=2$, $p<0.05$).

Use of online information sources as the preferred option for assignment use was very low for all users and for weekly users. No relationship was found between either rates of preferred or secondary use of online information sources for either professional or lay definitions and frequency of use.

No relationship was found between skills classification and use of online information sources for assignment or academic use. Nor was a relationship found between the amount students professed to liking computers, or to struggling with them and the extent that online information sources were used.

5.4 Questionnaire 2 Results Summary

Questionnaire 2 initially asked students about their recreational use of IT.

Students did not report a high tendency to use online information sources as their preferred way of finding information for recreational purposes.

Students' use of information sources for academic purposes was then explored by asking about a specific assignment, and about general academic use. Books were the most reported preferred information source for assignment use. Reported use of any online information source as the preferred option was very low. Online sources were much more likely to be used as secondary information sources. The unsophisticated use identified in questionnaire 1 was also evident in students' reported information sources for assignments. The more familiar choices, web sites and search tools, were used more than newly introduced tools such as subject gateways or e-journals.

Interestingly students reported higher use of online information sources for general academic use than they did for the more specific assignment related information use. The reason for this is not clear. It may be that students

perceived they used information sources more than they actually did; The specific question, in giving them a focus, may have produced more accurate information or they may have used online information informally but not for formal tasks such as assignments.

There was little relationship between recreational use, and no relationship between academic use, and the results obtained from questionnaire 1. Skill classification, liking computers and struggling to use them were found to be unrelated to reported use of online information sources in questionnaire 2.

5.5 Year 1 Results Summary

When taken together the research shows that in year 1 the students' use of computers was unsophisticated. Questionnaire 1 found that email and the www were the most frequently used Internet services. Use of discussion boards and messenger services was reported to be low. In questionnaire 2 this theme was continued with students reporting a higher use of known web sites and search tools than of less well known options such as e-journals and subject gateways, for meeting assignment and academic information needs.

No relationship was found between students reported ability or frequency of use in questionnaire 1 and their use of information sources, especially for assignment and academic use, reported in questionnaire 2. By the time students had completed questionnaire 2 they had already started their informatics theme (appendix 2) which may account for this result.

Overall the picture of the students is one of a willingness to engage with computers, and who can see the need and value of them in their chosen profession. They however lack skills and, even more importantly, an awareness of the skills that they will need as qualified nurses.

6 Results, Phase 3

This chapter presents the results from phase three of the research, undertaken in the final (third) year of the course. Sections 6.2 and 6.3 present the data collected from the third student questionnaire, this explored the students' use of information for academic purposes (section 6.2), and their experience of using computers in practice (section 6.3) during the last local placement that they undertook. Section 6.5 presents the information collected from qualified nurses and, drawing on the students experience as well, section 6.6 synthesises a picture of the use of computers in practice.

6.1 Background to Questionnaire Three

The third, and last, questionnaire was distributed at the start of the students' third (final) year. 207 students who started in September 2002 were still on the course. Questionnaires were distributed at refresher sessions at the start of term, and 129 were completed. This is 100% of those distributed, and 62% of the maximum possible had every student still on the course been given one. 84 (65%) respondents completed at least one other questionnaire, and 55 (43%) completed all three questionnaires.

Key characteristics of the students and the possible combinations of questionnaire completed were explored. There were no statistically significant differences found between the groups in respect of any of the key areas of computer ownership, reported skill levels, attitudes to computers, classification of computer skills or classification as a weekly user.

6.2 Use of Information Sources

The first section of this final questionnaire looked at students' use of information sources for assignments undertaken at the end of the second year, and for finding information about patients care and conditions during their second year placements. Students were offered six information sources,

two hard copy (books and hard copy journals) and four online information sources (research databases, web sites accessed directly, search engine and online journals)

Most students reported using a variety of information sources by this stage of the course. As can be seen in figure 18 students used more information sources for assignments than they did for patient related information. The mean number of any type of information source that students reported using was 5.08 for assignments and 4.12 for patient care information. Looking just at online sources these were also used more frequently for assignments (mean 3.32) than for information about patient care and conditions (mean 2.5).

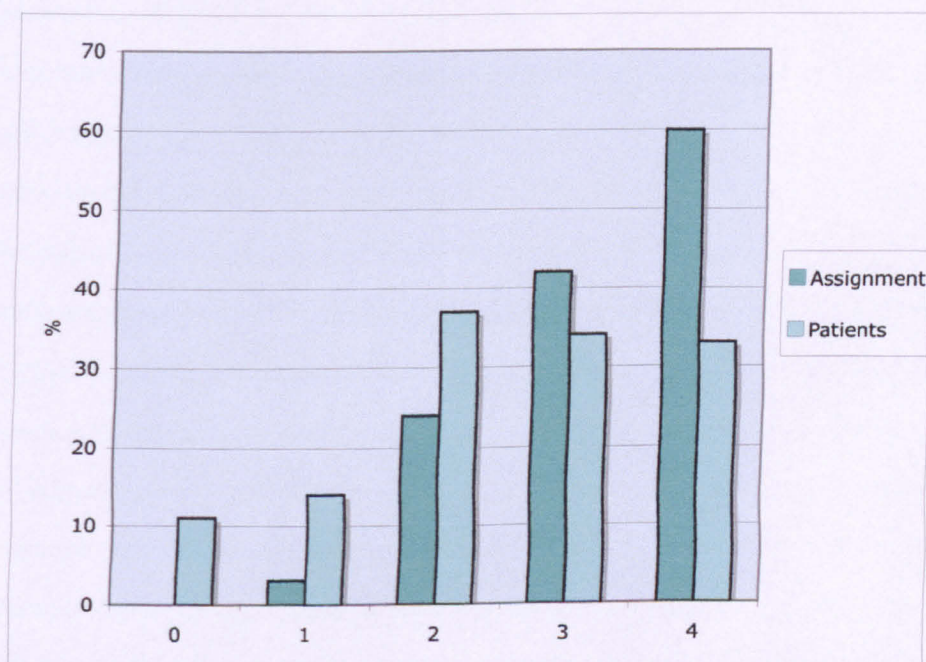


Figure 18
Number of online information sources used (n=129)

More students reported using information sources, both hard copy and online, in questionnaire three than in questionnaire two. Book use reportedly dropped very slightly, however it is at a very high level in both questionnaires.

The two classifications, frequency of use (weekly and less frequent users) and student reported skill levels at the start of the course were not found to be related to students' reported use of information sources for assignments or for patient information. Nor were relationships found with information use and the students' age or gender, or with students reported Internet skill level, or frequency of use of the web.

6.3 Computers on Practice Placements

Students were asked about their computer use on their most recent placement. 56% (n=71) respondents had been in a hospital setting. Placements differ widely and students reported placements in six hospitals, five managed by different NHS Trusts, and one private provider. Four hospitals had between 14 and 19 students each. The remaining two, one NHS and one private had 4 and 2 students respectively. Where comparisons are made across placement locations these latter two have been excluded due to the low numbers. 44% (n=58) of students reported that their last placement was in a Community setting. These were all NHS Trust placements, mainly attachments to community based nurses and as such covered a wide range of locations, sometimes with only one student per location. No further analysis of placement location was therefore undertaken because of the unreliability of such low numbers, and to ensure that anonymity of placement location and student was maintained.

6.3.1 Computer Availability and Use

Most students reported that were aware of computers available for nurses to use in their placement, only 7% (n=9) reported that they were unaware of any available computers. In acute settings over two thirds (68%, n=48)

reported that computers were available on wards, with 14% (n=10) saying that computers were only available in offices. There was no relationship found between computer location and the amount that students reported using them.

The majority of students said that they saw qualified nurses using computers during the placement. 67% (n=87) reported seeing them being used on most shifts, 9% (n=12) said that they saw qualified nurses using computers on a few shifts and 2% (n=2) did not see them used at all. Students' use of computers was lower with only 21% (26) saying they used computers most shifts. Over half reported low computer use, 33% (n=26) reported that they only used a computer on a few shifts and 23% (n=18) on no shifts.

Low observed computer use by qualified staff was related to students' low use, however observed frequent use by qualified staff was not linked to students use ($\chi^2=15.698$, $df=4$, $p<0.005$). Where qualified staff used computers infrequently or never 86% (n=12) of students did not use them either. However where qualified staff used computers on most shifts only 30% (n=25) of students also used them on most shifts.

The amount that the computer was used with a mentor (or other qualified member of staff) was also related to the amount that students used computers ($\chi^2=12.132$, $df=4$, $p<0.01$). Where students never used a computer with their mentor 60% (n=9) said that they only used them on a few shifts. When students always used the computer with their mentor use was also low, with 48% (n=13) saying they only used them on a few shifts. Student use was highest when they sometimes used computers with their mentors (figure 19 overleaf). This may be related to the degree of difficulty that the students perceived associated with negotiating access. Always having

to use the computer with the mentor may have been difficult to arrange, especially when considered with one student’s comment in the open question that using the computer ‘Felt like an inconvenience’

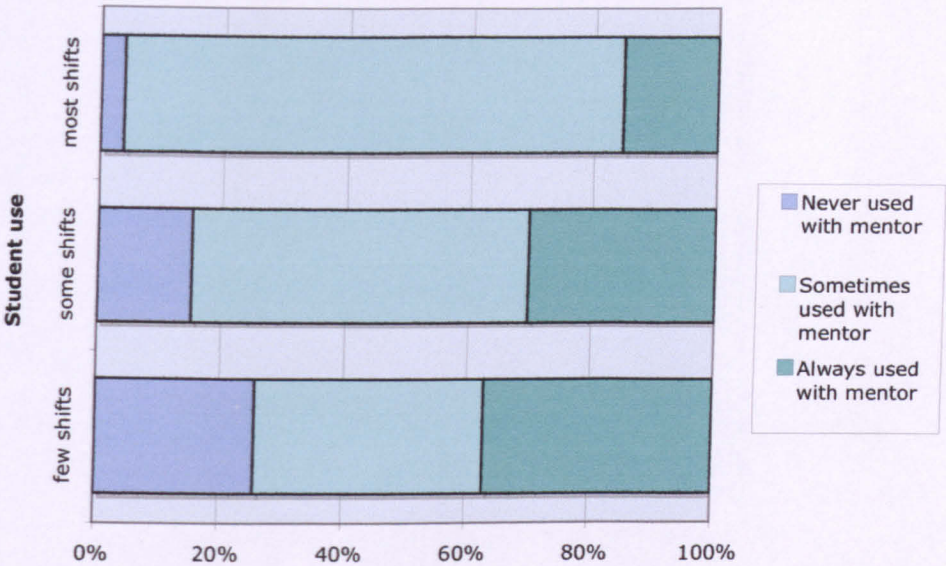


Figure 19
Mentor and Student use of computers (n=94)

Respondents were asked to say what they saw qualified staff using computers for, and what they themselves used computers for. The most frequently mentioned use for both groups was updating patient records and care plans. Email was used for communication, but with a low frequency for students and qualified staff. More frequently communication was through the computerised patient records being used to provide handover information. Students mentioned using the computer for research and accessing evidence based information twice as much as they said they saw qualified staff using this information. The tasks that respondents reported using computers for themselves, and seeing qualified staff use them for, are shown in table 7 overleaf.

Students			Qualified Nurses		
Rank	No of mentions	Task	Task	No of mentions	Rank
1	45	updating records	updating records	53	1
2	30	research / evidence base	test results	37	2
3	24	patient details	handover	25	3
4	21	test results	patient details	24	4
5	18	handover	research /evidence base	16	5
6	11	pharmacy	bed state	15	6
7	9	viewing policy	pharmacy	14	7
8	8	bed state	email	9	8
9	7	email	diary	6	9
10	6	diary	viewing policy	5	10
11	5	practice profiles	ordering supplies	5	11
12	2	ordering supplies	training / presentations	4	12

Table 7
Student and Qualified Nurse uses of IT

6.3.2 Encouragement to Use Computers

Students were asked if they felt encouraged to use computers on their placements. 23% (n=29) felt that they were encouraged a lot, a further 31% (n=40) felt a little encouraged however, 47% (n=60) said that they had not felt at all encouraged. The relationship between placement organisation and encouragement was not statistically significant, however as can be seen in figure 20 (overleaf) students said that they felt slightly more encouraged in community placement than hospital ones. One placement hospital (hospital 2) was notable because no students there reported feeling encouraged, 13 of the 19 students with placements in that Trust reported not feeling at all encouraged.

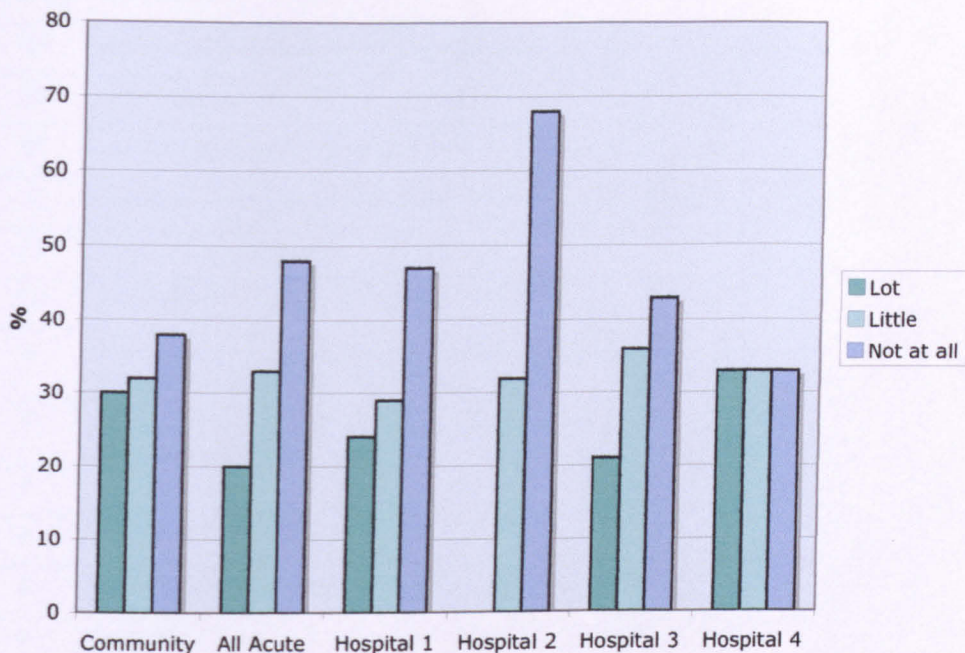


Figure 20
Placement location and feeling encouraged to use IT (n=121)

Students were invited to comment on what made them feel the way that they felt. This question was put as an open question to encourage students who felt either encouraged or not encouraged to comment. The comments were grouped according to themes that arose. Over two thirds of comments were negative as can be seen in the table of comments (table 8, overleaf), focusing on such things as lack of opportunity to use computers or poor skills. A small number of comments were neutral, such as mentioning that they were encouraged to use computers when the ward was quiet. Positive comments included support from mentors, and the observation that the computer was an essential tool in the placement environment.

Count	Comment	+/-
25	no encouragement / no opportunity	-
20	essential to do some key tasks / normal team work	+
19	ward very busy / limited time / low priority	-
16	mentor / qualified staff keen and encouraged me	+
11	limited access without password	-
10	not shown how to use it	-
9	Nothing, or very little, required to use computers for / computers not used much	-
8	staff generally apprehensive of using computers and / or have poor skills	-
7	I had to ask	-
6	qualified nurses tend to use computers on their own	-
6	access to computers limited	-
4	computer used by other staff (Doctors, Sister, Ward clerk)	-
3	easier for nursing staff to look up info than show/support me	-
3	encouraged when ward quiet	neutral
3	free access whenever wanted	+
3	I assisted other staff	+
3	I couldn't make the computer work (technical/training need)	-

Table 8
Comments about encouragement to use computers.

The involvement of the student's mentor was a significant factor in how encouraged to use computers students felt. As shown in table 9 (overleaf) always using the computer with a mentor did not lead to students feeling encouraged to use the computer.

	Encouragement reported		
	Encouraged a lot	Encouraged a little	Not encouraged
With mentor			
Always	4	21	2
Sometimes	11	23	3
Never	13	10	13
$\chi^2=20.684$, $df=4$, $p<0.001$			

Table 9
Use with mentor / student feeling encouraged to use computers (n=100)

6.3.3 Skills

Students were asked if they thought they had the necessary skills and knowledge to use computers in the work environment. As 'the necessary skills and knowledge' were not defined this was more a measure of the student's confidence than their actual skills or knowledge. A significant majority considered that they had at least some of the necessary skills ($\chi^2=24.500$, $df=2$, $p<0.001$). 33% (n=43) felt that they definitely had the necessary skills, 58% (n=75) thought they had some skills and 9% (n=11) did not think they had the skills they needed.

Students were invited to comment on what made them feel the way they did, and 68 students commented. The majority (n=38) felt that they had good computer skills and were happy that they could transfer those skills into workplace applications. A further 10 thought that whilst they had transferable skills they also needed some system specific training. 19 students said that they needed system specific training. 16 identified that the informatics input on their course had helped them to develop the skills and knowledge that they needed.

6.3.4 Skills and Encouragement

Exploration of students computer use, perception of skills and amount they felt encouraged to use computers suggested that having skills was not sufficient alone to promote computer use. 65% (n=13) of students who felt they definitely had skills and were encouraged to use computers did so on most shifts. Only one student who felt they definitely had skills but were not encouraged to use computers used them on most shifts. None of the students who felt encouraged, but did not consider they had sufficient skills to use computers on placement reporting using a computer during their placement.

6.3.5 Predictors of use in placement

Students' use of computers on placement was not related to reported use or skills at the start of the course. Students classified as weekly users at the start of the course were no more likely to report using computers, or having the skills to use computers than students who were classified as less frequent users.

Crosstabulations were also carried out with students' initial skill classification and reported use of computers on placement, and perceptions of having the necessary skills to be able to use computers in placement. There was no relationship found between these.

6.3.6 Training

Only 11% (n=11) of respondents thought that training was compulsory in their trust, as shown in figure 21 most students reported that there was no training provided for them.

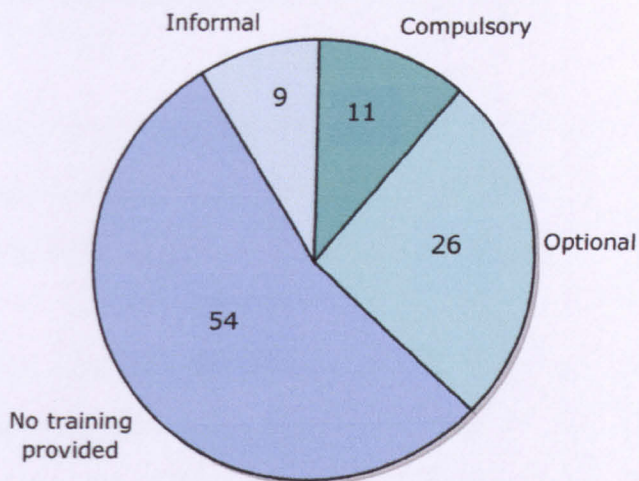


Figure 21
Training Opportunities

Informal training was that provided 'on the job' by the student's mentor rather than structured training being provided by the Trust training department. Only 17% (n=22) of all the participants reported having attended training on their Trust's IT systems.

Some students used the open question available to comment on training. This varied from feeling excluded

'They have a new system at (hospital) that requires training. Qualified nurses were invited to attend – students nurses were not'.

To identifying a need to be quite assertive in gaining support to meet training needs

'I had to ask about being showed how to use the computer and what it was used for, as part of the practice profile'

Where neither the mentor nor the student was particularly proactive in their computer use it was easily overlooked

'No training was offered. I must admit I didn't pursue it'

'The ward was very short staffed and therefore there was no-one free to teach me'

The amount of input provided when students only received informal training was identified by one student as being minimal

'No specific training session. My mentor spent 5 minutes showing me what to do'

Even if not minimal, informal training did not always meet the student's needs, one student who said that training was not available and that she had been shown how to use the computer by her mentor commented

'I did not feel that I understood the runnings of the computer completely, therefore in order to avoid mistakes I tended to avoid them'

Only 21 students commented on their non-attendance at formal training sessions, the reasons given are shown in figure 22.

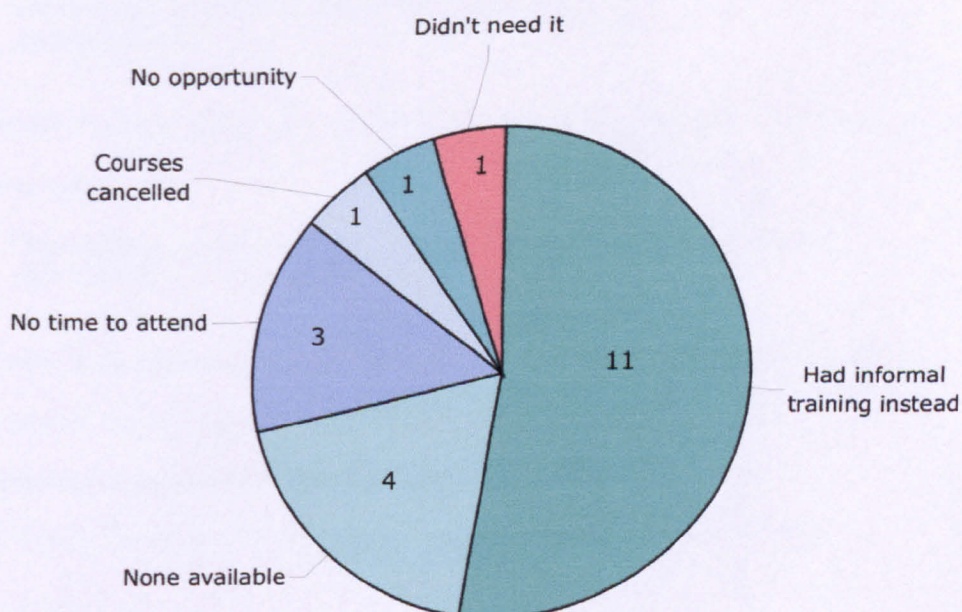


Figure 22
Reasons for not attending IT training (n=21)

The provision of training was related to the extent that students felt they had been encouraged to use computers. Where there was no training available 48% of students did not feel encouraged to use computers, and a further 44% only felt a little encouraged. The chi-square calculation was unreliable because too many cells had an expected count of less than 5, so the training options were collapsed to training provided or not provided and informal training (5 entries) excluded. This showed a significant relationship between training provision and students feeling encouraged to use computers, ($\chi^2=16.000$, $df=2$, $p<0.0001$). Of the students who felt very encouraged 87% had been offered training, only 22% of those who did not feel encouraged had been offered training.

Students reported feeling most encouraged to use computers when they sometimes used the computer with their mentor. One student, on an acute placement said

'Mentor asked me if I was happy to, supervised me a few times then allowed me to work as part of the nursing team which included computer usage'

However another student placed in the same Trust did not feel encouraged at all and said

'Throughout my placement I received no encouragement from any staff member to use the computers'

The role of computers in the workplace varied, not only between Trusts but also across locations within the Trust. In some placements students experienced computers being an essential working tool.

'It was the method of communication between nurses and doctors'

'I had my own patients to provide care for, and always documented the care in their notes.'

Other students' experiences suggest that using the computer was not seen as a core activity

'When the shift was more quiet we got together and used the computer'

'Didn't need to use it, as was working with District Nurse'

'They never mentioned for us to look anything up on computers. When looking at patients details they were going to visit, they directed us to hard copies of everything'

'The sister spent quite a lot of time on the computer. The nurses do not really use the computers very often on the ward, only to do the handover sheets for the next day, so they often encouraged me to do the handover sheets for experience'

Several students commented about who used computers in their placement locations

'Very fast turnover of patients, maybe in and out in 4 hours so paperwork was used, doctors wrote their own notes up on computer'

(computer use)' was never greatly discussed. Often the computer was occupied by medical staff'

'The ward clerk does the majority of computer based work'

Some possible reasons for the lack of encouragement were identified by students. One was the time that it took to show the student,

'As it is busy on wards it was easier for the nursing staff to look up information'

Felt like an inconvenience, staff appeared to have no time to assist me in using the computer

Another reason, mentioned by several students, related to the skill of the nurses they were working with

'Most nurses knew how to use the system but they often required assistance from the ward clerk'

'I often helped members of staff find information on the computer by informing them what to click on or type owing to my past experience and updated skills on this course'

Only the Sister in this community placement accessed the computer, although other staff were at the time attending computer training sessions to gain experience and knowledge to be able to gain access to computer in the future.

As well as a lack of skills some students identified that the qualified staff were not aware of the things that could be done through the computers

'A lot of the paperwork done on the ward could have been done more efficiently on a computer, but staff seemed generally apprehensive of using (computers) for anything. They expressed nerves regarding IT and were surprised that you can access nursing journals etc online. They are very reluctant to further IT skills in general'

'There was a lot more on the computer than just for recording visits made such as performing surveys etc, BNI, but that was never told to me, found it myself and half of the nurses there didn't know about software I had found'

The use of qualitative data helps to illuminate the descriptive statistics produced by the questionnaire. The overall picture is that whilst there are differences in students' experiences in community and acute hospital placements, there are also differences both between and within individual Trusts.

One student commented that she was concerned about the lack of encouragement to engage with computers as *'computers will have an ever increasing role in the future'*. Lack of awareness of how to use computers, and of the resources computers make available was an issue for qualified staff identified by some students. Students who felt confident in their own skills and knowledge were willing to share this with qualified staff.

6.4 Questionnaire 3 Results Summary

The first section of questionnaire 3 explored students' uses of information sources for academic purposes, and for locating patient related information. Students still relied on books as their primary source of information, but all students reported using online information sources at this stage of their course. Students reported using more information sources when looking for academic information than when they were looking for patient related information, this applied to printed and electronic information sources. Students initial reported skills, use and attitudes as reported in phases 1 and 2 of the research were not found to be related to the use that students reported making of electronic information sources for academic or patient information in questionnaire 3.

The focus of the questionnaire then moved to students' placement experiences. Most students knew where computers were available in their placement sites, and most reported seeing qualified staff using computers. Students reported that their own use was lower than qualified staff. The extent to which the student used a computer with the mentor was a significant factor in students' use of computers. Students who said that they sometimes used the computer with their mentor reported the greatest use.

Students reported seeing computers used mainly for administrative tasks. The tasks they reported carrying out themselves were similar to those they reported seeing qualified staff using the computer for. One interesting difference was that students perceived that they used computers more for research and accessing evidence based care information than qualified staff.

Students were asked if they felt encouraged to use computers, and almost half reported that they had not felt at all encouraged. Students were encouraged to expand on their tick box answer in an open question. Two

thirds of the comments were negative, the most frequent comment falling into the theme of not encouraged / no opportunity to use computers. Almost as many students felt that time had been a limiting factor with using the computer being a low priority on a busy ward. The most frequently reported positive theme was that the mentor, or other qualified staff were keen and encouraged the student. One theme identified was that students perceived qualified staff to have poor informatics skills.

Most students reported that they thought they had at least some of the skills that they needed to use computers in placement. Most attributed this to having good computer skills that they could transfer into the workplace. Some mentioned that the informatics theme on their course had helped to prepare them. The need for training was identified by some students. Being offered training also contributed to students feeling encouraged to use computers. Informal training by mentors was not found to be adequate by some students.

6.5 Group Interviews

As reported in chapter 3, three group interviews with qualified nurses were held. The first was with three senior nurses. Interview two was with six nurses working in an acute care hospital setting, and interview three with six nurses from the care home sector. The senior nurses had either senior clinical or senior management roles, and would not normally work with students on a daily basis or act as mentors to them. The 'ward based' nurses in groups two and three are nurses directly involved in patient care and work with student nurses on a daily basis, frequently in the role of mentor.

The difference between the senior nurses' and the ward based nurses' attitudes to the group interviews was quite marked. All the senior nurses were keen to engage in the discussion, bringing their practical experiences of using computers into the discussion and appearing genuinely interested in sharing

their views and developing the questions asked. The ward based nurses by contrast often had little practical experience to contribute, and whilst they answered direct questions politely there was little interest in the topic, and few unprompted comments.

6.5.1 Group Interview with Senior Nurses

All three senior nurses when asked if they thought nurses needed to be able to use computers strongly asserted that they did. When asked what for the first things mentioned were patient records, recording care, & management information and accessing administrative information (e.g. study days and minutes of meetings). One participant then mentioned that all her trust policies and procedures were available on the intranet, but that was not echoed by anyone else. Another said that her trust was using the intranet for learning and teaching materials as they were no longer able to release staff from wards for long periods.

When prompted to think about anything that they personally did in addition to the things they had identified as being a reason that all nurses to use a computer management focused tasks were mentioned, reflecting the workload of senior nurses. These included requesting patient tests and managing caseloads

Asked if they thought that their computer use was typical of the nurses who they worked with there was agreement that they were definitely not typical in that they used computers much more than most other nurses.

"I think we maximise the use of computers"

"the majority of nurses I work with are computer phobic"

"Yes, they do just enough to get by, its hard work getting them to use it"

Experiences of the availability of equipment varied.

"In general practice all nurses have a computer on every desk, all connected to the NHS website, email and Internet. Whether they use it or not is different thing. I don't think that many nurses Its difficult to get nurses to use email"

Some Primary Care Trusts however were identified as having a shortage of equipment with staff frustrated by a lack of access when it was needed.

As equipment had been mentioned this was explored as a possible reason why other nurses made less use of computers. Access however was not the reason that these senior nurses thought other nurses used computers less than they did. There were a variety of reasons suggested, including that many staff have a fear of computers, a theme that occurred in answer to several questions. Another reason agreed by everyone was that hands-on patient care was seen as being more important than supporting activities such as record keeping.

"Something about - on a busy surgical ward – sitting, you feel guilty"

"patient care giving is a very direct physical contact thing isn't it, they do see getting on a computer as a separate issue"

All three thought that computer use would change over the next five years.

The main driver for change was seen as being the government agenda, with financial investment in IT, the electronic patient record and the need to provide evidence of meeting government targets.

"the most accurate way of being able to get a target is to be able to search on it. MMR - flick of a button and its there, better than looking through 6,000 records. If the target isn't there you don't get paid"

The group were then asked to listen to a sample of students' comments, representing a range of experiences, and to say if it sounded like an experience that students on placement in their Trusts might experience.

In response to statement about the actual use (or lack of use) of computers

The senior staff considered that trust intranets were a good source of

information about policies and procedures. This was not one of the things that students often used computers for, or saw them being used for. Senior staff expected that qualified nurses would be supportive of students use of computers, with the expectation that mentors would supervise students' computer use, and when happy that the student was competent would encourage its use as part of the work on the ward/clinic

"It's what I'd expect"

"yes, I'd also expect on going support for the students"

"I would hope they wouldn't encourage them to work at home (in preference to the wards) they wouldn't bother"

When offered the statement 'Most nurses knew how to use the system but they often required assistance from the ward clerk' there was some doubt if the ward clerk was generally the best person to be seeking support from. However the need for some sort of front line support for staff was agreed, a more experienced user on the ward was seen as acceptable

"I would have thought that anyone new onto a ward using a system would like to know someone would be around to help"

"I've seen them (ward clerks) helping staff out frequently but that's because of failure of the IT system, like the printers jammed or the computers crashed. Its usually the ward clerk who goes and sorts that out"

In response to the statement 'A lot of the paperwork done on the ward could have been done more efficiently on a computer, but staff seemed generally apprehensive of using (computers) for anything. They expressed nerves regarding IT and were surprised that you can access nursing journals etc online. They are very reluctant to further IT skills in general' There initially appeared to be a difference of opinion, with one nurse's very quick comment being

"Hmmm. I don't think I'd agree with that ... the younger nurses coming into the practice know what they are doing"

after further discussion there was agreement that some nurses, possibly more mature ones, fitted the picture painted by this student's comment.

"The older ones don't really want to get involved in it"

There was also some discussion about whether reluctance to use computers was an ability issue or if it was part of nursing culture, that activities not directly involving patients are not seen as being part of patient care

"Overseas nurses are reluctant to use them, its not that they aren't capable, they're all emailing home. They're not frightened of it... they don't see it as part of clinical nursing"

Comments received were summarised back to the participants to confirm understanding, 'most of what you've said sounds as though its using computers for management, recording, getting records, updating records'.

Whilst there was agreement that this was what had been said all three were keen to also stress the value of computers as a source of information

"Accessing literature, current literature individually by a motivated person"

"(nurses tend to) ask someone about the latest method of treating something rather than going and looking it up"

As an illustration of this point one senior nurse gave the example of an unfamiliar piece of equipment recently used in her trust,

"There was a strange supra-public catheter on a patient the other day, everyone who went on the ward that day was going - oh have you seen this - do you know anything about this. No-one had thought to look it up. I mean there was a name on the tube, could have just typed it in"

This scenario had resonance with the group with another participant agreeing

"No-one thinks to go and see what's best evidence based practice ... everybody waits until someone tells you"

When asked about the value of computers for direct patient information all of the senior nurses agreed that this was an increasing occurrence.

"patients are coming to outpatient clinics saying almost exactly this is the treatment they're doing and I'd like it as well please"

a situation that they did not think most nurses were ready for.

"We're not prepared are we?"

There was also concern about patients' ability to access 'good' information and understand it

"They get misled, for example for ... (talking about a condition that a certain type of honey, prepared in a certain way, has been found to be an effective treatment for) they think you can go to Tesco's and get a jar of honey off the shelf and stick it on, and they can't"

As senior nurses the participants felt that they helped their patients to find information on the Internet

"I think senior nurses, or at least us as a group, are good at saying to patients - there's a really good stroke website, but I don't see much of that happening"

When asked "What do you base your knowledge of what a good website is on? 'How are you making that decision'?" The response was that it was a skill they had, educational courses they had all been on were considered to have been helpful in developing this skill. There was some disagreement over whether all nurses had sufficient skill and knowledge however. One commented

"I think most nurses know how to put a word in google",

That was not agreed with by the others, a contradictory viewpoint being offered

"they think that if they type a word in they will get everything they need to know, and they won't"

To explore what knowledge the group thought was necessary they were asked if they thought that they, or nurses in their areas would know anything about risk management in respect of recommending websites to patients. There was general agreement that most nurses had very limited knowledge of this aspect of using the Internet for patients

"I'd say no, when you said risk management I thought Oh my goodness! Because you do it with your own knowledge and

experience but I've never thought about risk in recommending a website"

Moving back to the use of computers generally the participants were told that when students were asked if they had the skills to use computers most of the feedback was around knowing how to turn it on, use the keyboard etc. and asked if they thought that most nurses were aware of data protection?. One participant considered that nurses should know about it

"I'd say we do but then we've got a whole department for data protection, caldicott guardian... as soon as you turn the computer on its flashing at you - data protection act"

This was not supported by the others, with concern expressed about sharing information across organisations. All the group agreed with the comment

"I think they're aware of it, but I don't think they're used to putting it into practice"

The group then raised the example of a unit on the pre-registration nursing course, the Final Integration Unit, where students are required to complete a project, researching and producing a new or improved procedure, documentation or piece of information. The senior nurses had recently attended presentations of these projects by students in their trusts and one commented that whilst students were using PowerPoint to support the presentation they were developing paper based documentation, and asked the group if they had any suggestions why this might be. Everyone agreed with this experience

You'd think these would be our most IT visionary students, (you'd think it wouldn't you) (laugh - yes) But it is usually another piece of paper isn't it

One possible reason suggested was that the students lacked the skills to develop something IT based. Thinking about their own experiences of trying to develop anything IT based problems were acknowledged

"We're quite good at saying this is what we'd like, and then we're given a load of jargon - you'd need this this and this package and stuff and you think oh!"

"I wanted a really really wizzy thing done that was exciting and interesting and they came back with - well, I don't know if we've got the memory for that. And I wondered was it the memory, or was it the time. I don't know enough to argue with them"

6.5.2 Group Interviews with Ward Based Nurses

Considering the experience and jobs of the nurses in interview groups two and three a different range of questions was asked, starting with asking if they used computers in their work, and if so, what for. Barriers to use, and nurses attitudes towards computers were then explored.

Most of the nurses in group two did use a computer in their work, mainly for administrative tasks such as updating the bed state or checking test results, both essential tasks that could only be done through the computer system. This group of nurses also considered that generally their skill levels were quite poor. One nurse said *"I'm not very good at it, I only use it occasionally, and then I just fiddle around until I find the right answer"* When asked what would make it easier the prompt reply was *"no computers"*

One of the nurses reported using the computer for checking policies and care information but added that usually it had to be done during breacktime rather than worktime, printing information out and reading it later when there was the time. This was echoed by another two nurses, who felt that whilst they had the basic skills necessary to use the computer the biggest obstacle was a lack of time.

Access to equipment was a problem for some nurses, with complaints about the age and speed of the equipment available, and one nurse identifying the

problem of there only being one computer available at the nurses' station, and that it was often being used by Doctors.

One nurse did not use the computer at all, considering that was not relevant to the work, saying *"I've got no reason to go on it"*. Another nurse, who did use the computer for some administration tasks did not use it for anything else because *"I really don't know what's on it"*.

Another nurse agreed that about not using the computer much, saying *"I can't access the EPR. I rely on the clerical staff to look things like that up for me"*. This participant did go on to say that IT could be a useful tool, that however may have been in deference to my research, as the participant then went on to say *"time on the computer is just time away from the patient, and I'm always going to put them first"*

In the third group interview the nurses' experience of IT was also initially explored. Asking about computer experience at work did not generate any responses, so participants were asked about their skills instead, with some suggestions offered, ranging from *"pretty good"*, through *"I can use one but not very well"* to *"I've never used one"*. One participant offered the suggestion that a colleague was pretty good, but the colleague did not support this. On further questioning the colleague did agree to being able to get the computer to do most things and could resolve problems if they occurred. The nurse who had offered the view of the colleague then reiterated the belief that the colleague was quite good, comparing it to their own perceived lesser skills saying *"I have to ask our administrator when I get stuck"*.

Part way through the discussion one nurse offered the information that she had been on a course, which mainly used computer based learning materials,

which she had found very difficult and did not feel that she had gained much competence from.

One nurse considered herself to be computer illiterate, a colleague said that this also applied to her. Both were overseas nurses and attributed this to the culture they had come from where computer use was not generally encouraged, and was not seen to be part of nursing practice.

The nurses were then asked how important computers were in their everyday work. Other than the senior nurse the response was that they do not use computers in their work. The senior nurse explained a project that she had asked some students to do, researching and recording residents' medication so that a computer record of why the resident was taking each medication along with key information about the medication was available. She also discussed a project she was about to embark upon of creating an electronic care plan for each resident. The other participants listened politely but were not very interested in discussing the project with the senior nurse and even with prompting did not offer any suggestions about developments in their practice areas.

Finally data protection was discussed. One nurse commented "*we are told about the data protection act, but not what to do about it*" Another asserted "*anyone can hack into a computer*"

In spite of the current lack of interest in computers by all except the senior nurse the group did all agree with the comment made that "*Computers will be increasingly more important*"

6.6 Summary of Group Interviews

The attitudes of the two types of nurses interviewed were quite different. Irrespective of the interview group they were in the senior nurses engaged with the discussion and expressed interest. The ward based nurses, who are the ones that work with, and are mentors for, student nurses were polite but were not enthusiastic about discussing their use of computers.

The senior nurses interviewed were users of IT, and were knowledgeable about its use for improving as well as recording care. Whilst they thought that they used computers more than other nurses they did expect all nurses working with students to provide a supportive environment. They did however identify that ward culture valued direct care giving more than it valued computer based support tasks.

The senior nurses had experience of patients arriving in their clinics with information obtained from the Internet, but did not think that they were prepared for supporting their patients in their information seeking, identifying a lack of knowledge more than a lack of skills. They also expressed concern about their, and other nurses, ability to apply the principles of the legal framework for use of IT. The ward based nurses also expressed concern about data protection issues.

Another problem raised was their ability to enter into an informed discussion with IT experts to enable them to develop their use of the systems available to meet their needs, finding that they did not have the knowledge to question what the experts told them, even if they were not satisfied with the answers they received.

Ward based nurses generally did not consider that they had good computer skills, nor did they report much use of computers. Where they were using

computers it was mainly for administrative tasks, such as accessing patient test results, where only computerised systems were provided. Whilst some nurses reported that they did not use computers because they were unaware of what could be done on the computer. Other nurses wanted to use the computers for accessing evidence based care information, but did not because they felt that this was not supported by the ward culture.

6.7 Summary of Phase 3 results.

There was a high level of consistency in the information about use of computers in practice obtained from students, ward based nurses and senior nurses. There was general agreement from student and qualified nurses that computers would become increasingly important in healthcare.

Drawing on the information obtained from qualified nurses and from students the use of computers was mainly for essential tasks when unavoidable.

Computers were not being used as information tools, either for developing or ensuring the quality of practice, or in support of patients' information needs.

Ward based nurses perceived themselves, and were perceived by students and senior nurses, to have poor skill levels and a lack of awareness of what, other than routine administration, could be done through the computer.

Students often did not feel encouraged to use computers, reasons for this included the attitude of the mentor and other qualified staff and the availability of training on systems. Students and qualified staff create a picture of a culture that does not encourage computer use as an integral part of nursing practice.

The majority of students felt that they did have the skills that they needed to be able to use computers. Some felt that they would have liked to have been offered Trust system specific training to supplement this. The informatics

education received during their course was mentioned by students as influencing how confident they felt about their skills.

Students' experience at the start of the course was not found to be related to either the use students made of computers on placement, or their perceptions of the adequacy of their skills to use computers on placement. Two key factors influencing their use of computers were identified. In order to report using computers in placement students needed to believe that they had adequate skills to be able to use computers. A perceived lack of skill was related to low use of computers in placement. Having skills was not by itself sufficient for students to report frequent use. For students to report frequent use of computers they not only needed to consider that they had adequate skills, they also needed to feel encouraged to use computers by the practice placement staff and culture.

Chapter 7 draws on the information obtained from students and from qualified staff and reported in chapters 5 and 6, and on the literature reviewed in chapters 2 and 3 to explore and answer the research question identified in chapter 1.

7 Discussion

The research question posed was: Are nurses entering the profession ready, willing and able to utilise information and technology to support their professional practice and development?

The aims of the research were to

- discuss the statutory and policy drivers for embedding nursing informatics in practice, and in pre-registration education
- identify the nursing informatics elements needed in pre-registration education;
- explore the factors that influence how students nurses develop the necessary nursing informatics skills through their pre-registration education programme.

In order to assess the results in relation to the research question this chapter will first review how nurses are using, and could benefit from using, information and technology to support their practice and development and the skill set that they need to be able to do so. Once that is established the question of how 'ready, willing and able' newly qualified nurses are can be explored, as can any steps necessary to address any gaps found.

7.1 Expectations and Use of Information and Technology in Practice

The literature review highlighted several drivers currently encouraging nurses to use IT. Some come from the development of NHS policies (NHS Executive 1998, NHS Executive 1999a, DoH 2001a, Welsh Assembly Government 2003); some from competency frameworks and development documents (NHS Executive 1999a, NHS Executive 1999b, NHSIA 2001a, DoH 2004a, DoH 2004b); some from professional body requirements (UKCC 2001); and some from academic requirements (QAA 2001). There is, as was noted, a lack of consistency between these various policies and documents, even where they all arise from the same organisation. The need to ensure that nurses have informatics skills has been demonstrated, however there is no consensus about the specific skills and knowledge required.

7.1.1 Use, and potential use, of computers in practice

The research carried out in this study found that student nurses and qualified nurses were using computers for a variety of purposes. The majority were process focused, such as updating patient records or reviewing test results. Neither student nurses nor their mentors mentioned audit or clinical governance as uses that they put computers to. The senior nurses in this research and the NHS (DoH 2004b) agree that this activity may be more appropriate for senior nurses. This is partly understandable as senior practitioners are more likely to be in posts where they have responsibility for ensuring the quality of a service not just their own personal practice.

The role of informatics in maintaining quality of care at an individual level is however important for all nurses. This involves ensuring that the care provided is based on up to date knowledge of research and evidence based best practice, and that the outcomes of care are measured and reviewed (QAA 2001, Kennedy et al 2001, DoH 2002a, Welsh Assembly Government 2003). Hard copy information can be used to meet this need. However studies (e.g., Donald 1998, Thompson et al 2001) have found ward based information to be unreliable, and libraries too remote for easy use. Information needs to be readily available at the time it is needed therefore computer based information systems are the most effective way of meeting this information need. The senior nurses in this study considered that nurses have poor awareness of these information sources. This is supported by the students, who reported that their own use of computers for accessing evidence based practice information was higher than that of qualified staff.

Whilst the participants in this study did not particularly comment on e-learning as an activity they used computers for, the NHS identifies that the ability to use e-learning is an increasingly important skill for staff

development. This is an area that the literature review found to be of increasing importance in both pre-registration education and CPD activity.

Using computers for communication was mentioned by students and qualified nurses. Computerised handover systems were the most frequently mentioned communication method by students, which they reported as being used by themselves and by qualified staff. Email was also mentioned, but not as frequently. This was supported by the comment from the senior nurses that although they used email they found it difficult to get other staff to use it. Updating patient records was mentioned as an administrative task, however these are also a method of communication, especially between the various professions that are involved in a patient's care.

Some qualified nurses in the group interviews acknowledged the value of the Internet as a patient information tool, and identified that they needed to be able to support patients in meeting their information needs. This has been identified as an increasingly important area of patient care (Kennedy et al 2001, DoH 2002a, Welsh Assembly Government 2003) and is one that patients are engaging with and need supporting in (Hardey 1999, Potts & Wyatt 2002, Kemper & Mettler 2002). Professionals, including nurses, have been found to lack the skills to do this effectively (Jones et al 2001, Fieschi 2002). Donald (1998) found that nurses who had received training in evidence based medicine used these skills to support patients' information needs as well as their own.

In emphasising that nurses did not use the Internet to the detriment of patient care Morris-Docker et al (2004) do not seem to have considered the possibility that the nurses' use of the Internet could be part of care giving by involving the patient in information seeking activities. The views of some of

the nurses interviewed in this research also suggests this lack of awareness of this potential use of the Internet. Given the developments in consumer health informatics, frequently driven by patients rather than professionals or government, this is an area of increasing importance and it will be necessary for all nurses to engage with IT to meet their patients' needs.

7.2 Skills and Knowledge Required

There are competing views about the skills that nurses' need. Studies have found (Murphy et al 2002, Murphy et al 2004) that some nurses' perceptions of the requirements are limited to basic IT skills. Various NHS documents detail lists of competencies, and several academic disciplines contribute to the debate. The student nurses in this research tended to focus their comments about the skills they needed to use computers in practice around basic computer skills. The ward based nurses acknowledged their own skills to be poor.

Having adequate computer skills to use a computer for the purposes identified is an essential requirement, but to be able to fully meet the nursing informatics requirements of modern nursing nurses need more than basic computer skills. Models of computer literacy (Martin 2002, Poynton 2005) move beyond the lists of skills approach identified by Johnson & Eisenberg (1996). Nurses need information literacy skills to fully engage with evidence based practice and to provide support for patients.

Two of the models of computer and information literacy discussed in chapter 3 are particularly helpful in identifying what skills nurses' need. To use computers effectively nurses' attention needs to be on evaluating how the computer is, or can be, used rather than on the practical skills required to master the machine (Martin 2002). The use of computers in healthcare is evolving, therefore nurses skills need to be 'future proofed' as identified by

the National Academy of Science (1999), ensuring that they can be transferred to emerging systems and equipment.

The senior and ward nurses mentioned information governance as being important, their comments highlight that nurses not only need to know the legal and ethical framework they have to work within, but also the practical implementation of those principles. Considering the work of Sasse et al (2001) it is likely that *lapses in good security practice* are frequent occurrences but go unnoticed or unrecorded unless they result in a major incident, such as that in the Melton Rutland and Harborough PCT (Anon 2005). In this example staff were unaware that they had patient identifiable information, and that their use of it breached rules. This report clearly demonstrated that 'good enough' skills are not good enough for the professional use of computers. Information governance and security is therefore an essential element for pre-registration education.

Senior nurses also recognised that nurses need sufficient knowledge about the *capabilities and limitations of computers* to be able to enter into informed discussion with the system experts in order to develop systems, or the use of systems, that met their needs. This need was also identified by Darbyshire (2004) and the RCN (2004b). Protti (2002) found that NHS computer users did not see the ways that computers could help them. This sentiment was echoed by the ward based nurses, a theme arising from their comments was a general lack of understanding about what computers could be used for to help them in their work. This was reinforced by students' comments about qualified nurses lack of awareness of the potential uses of computers.

7.3 Ready? - New Students' IT Skills and Experience

This research found that computer ownership amongst new students was high, with 80% of students reporting having access all year round, and 91%

having some computer access, compared with 55% of households in the 2002 General Household Survey (ONS 2004).

The students reported having positive views of computers. Almost all thought that the Internet was a good source of health information, and that computers were essential tools for the nurse of the future. Over 80% reported that they liked using computers. Almost one quarter of the students who said that they liked computers also said that they only used them if they had to. This variability may reflect some degree of dissonance experienced by the students knowing that they were going to have to use computers. It may also have been because the students consciously or subconsciously wanted to give answers that they thought reflected positively on themselves, or wanted to 'please' the researcher but were not consistent in doing so across all the questions. Even allowing for this apparent inconsistency the majority of students had positive attitudes to the importance of computers and to their own use of them.

Students' ability to carry out basic tasks, and their ability to accurately judge their own skills levels were somewhat lacking. Students' self reported skill levels, when compared to their stated ability to carry out certain tasks, showed that some students had a low awareness of what type of task ability was expected at a basic skill level by external standards, such as the ECDL. This is an important reference standard as it has been adopted by the NHS with the support of the RCN as the minimum basic skill level needed by nurses. A similar lack of awareness of skill levels was found by Curtis et al (2002) and Bond (2004). Students did not appear to associate a lack of ability to cope when the computer did not respond as they expected with their skills levels. Students' own assessment of their skill levels cannot be used as

a reliable measure of their possession of the computer skills that they need for professional use.

Students' poor ability to judge their own skill levels has implications for education programmes. People who think that they have good computer skills have been found to assume that they therefore also have good information skills (Brown et al 2003). When this is considered alongside a lack of understanding of the skills that are actually required there is a danger that students will not be aware of their nursing informatics learning needs and may therefore not take steps to ensure that they meet them. As has been found informatics is frequently not an assessed element of pre-registration nursing programmes (NHSIA 2002a) therefore this gap in knowledge may not be noticed in the university setting. Mentors also frequently have poor informatics awareness and skills so it is quite possible that this deficit will not be noticed in practice either, which means that there is a risk that students could qualify lacking required skills and knowledge.

Whilst there is a need to help students to recognise their learning needs this needs to be done without damaging their perceptions of their self-efficacy. Theories of computer efficacy (Torkzadeh et al 1999, Torkzadeh & Van Dyke 2002, Hasan 2003) suggest that students with a low self efficacy belief are likely to have less ability to acquire new skills than those with higher self efficacy beliefs, and that they benefit from training programmes less than people with high self-efficacy. Reducing students' confidence could also increase their anxiety levels. Chua et al (1999) found that anxiety about using computers leads to lessening of their use. This study also found a relationship between concern and use. Students who reported having doubts about their ability to use computers reported lower levels of use than their more confident colleagues.

The relationship between computer skills and anxiety and age is a repeated theme in the literature (e.g., Freudenthal 2001, Matheson & Babb 2002, Zhang 2004,). This was supported to some extent in this research as older students reported their skill levels to be significantly lower than their younger colleagues. It was not, however, carried through to participants stated ability to carry out tasks 'without problems' where, for the majority of tasks, no significant difference in age and ability was found. This suggests that the age link is related more to the participant's reported confidence in their skills, rather than their actual skills. This was also found by Chan et al (2004).

Given the amount of IT included in the national curriculum it may be thought that younger students would already have good basic computer skills. This study has not shown this to be the case. Whilst younger students did tend to report having better skills and an ability to carry out more tasks than their older peers this was not generally statistically significant. Younger students still reported a low ability to carry out the tasks needing the greatest understanding and skills.

Whilst this study has not explored the underlying reasons for this, anecdotal comments from students suggest that a lot of school work is done in groups, and the pupils who do not like computers try to work with friends who do, so their need to actually use the computer is minimal. Other students suggest that they were able to give IT up after key stage 3 (age 14) meaning that it is at least four years since they had to use a computer so they have forgotten any skills that they did have.

7.4 Able? – Computer use and expertise in practice

IMIA (2000) recommends that nursing informatics education should occur once the student has sufficient clinical experience to understand the context, but not so late in the programme that they do not have opportunities to put it

into practice. As the final phase of data collection was carried out at the start of the final year of the programme the students should have had a good grasp of the nursing informatics expertise that they need by this stage of the research.

The students did report an increase in their use of information sources for academic purposes in the two years between the 2nd phase of the research and the final phase. Internet searches were still the most frequently used online academic information source. The use of e-journals and research databases increased compared to that reported in questionnaire two. Students reported making less use of information sources to access information about patient care and conditions than they did to support their academic experience.

In discussing the use of computers in practice by qualified staff, the students reported that the majority of tasks they saw being carried out were administrative rather than supporting care. This supports the findings of Russell and Alpay (2000) who also found that, in the main, the use that the majority of nurses were making of computers was the updating of patient records.

Students did not report seeing qualified nurses using computers to access patient care information on a frequent basis. This lack of use of computers to support practice was also commented on by senior nurses who discussed that qualified nurses often did not instigate information seeking activities into unfamiliar conditions and equipment, preferring instead to ask colleagues. Even when the colleagues could not supply the required information nurses did not initiate any independent searching strategies. This is consistent with the picture developed over several years in the literature review with qualified

staff being found to have low use of information from research to support clinical decision making (Donald 1998) research databases (Griffiths & Riddington 2001) Internet based information sources (Estabrooks et al 2003, Morris Docker et al 2004)) and an online clinical information system (Gosling et al 2004).

The reasons for the low use of evidence based information is accounted for in varying ways. A lack of access to computers was raised as an issue by the RCN study (2002b). This was an issue for a few nurses in this research who commented that either the access to computers was limited, or that they were frequently occupied by medical staff. Most students however reported that they were aware of where computers were in their placement location. Over one third saw qualified nurses using them on most shifts so computers were available. Another reason often raised is a lack of skills by qualified staff. All of the participant groups in this study, students, ward based nurses and senior nurses acknowledge a lack of informatics skills in qualified nurses. This is the reason given by Donald (1998) for low use of statistical research based information, by the NHSIA (2002b) in their survey of nurses' IT competence, and by Morris-Docker et al (2004) in looking at nurses' use of the Internet in clinical settings.

Lack of IT-related skills, however, cannot fully account for the low use of patient care related information in practice. Students reported that qualified nurses were using computers for some purposes. Only 11% reported seldom or never seeing qualified nurses using computers, which suggests that most did have some skills. The students themselves did not lack the skills to use the computers to access patient care information; they were using the same skills to access academic information, but they used the skills less frequently to find information to support their practice.

At the start of the study students' self reported task ability was quite poor, and their use of systems, especially the Internet, was unsophisticated, an observation also made of the nurses in the study about the use of the Internet in ward settings undertaken by Morris-Docker et al (2004). One important difference however is that the students in this study received an education and skills programme to help them develop the skills that they needed. A lack of training for qualified staff was noted by Russell and Aplay (2000) who found that nurses wanted to improve their skills but found accessing training difficult. A similar finding was made by the RCN (2004a) who found that whilst nurses thought IT training was important they were not attending any to develop or maintain their skills.

The nurses in the Morris-Docker et al study (2004) did not appear to learn how to improve their Internet and searching skills through experience. Several years earlier Getty et al (1999), found that nurses did not want to be left to work out computer use for themselves, preferring rather to have access to expert trainers. More recently, the RCN study (RCN 2004b) made a similar finding, some nurses reporting that they were expected to 'get on with' using computers, which they did not consider to be adequate.

No predictors of students' use of online information sources for either assignment or patient related information were found. There was no significant relationship between either the classification of students' frequency of use prior to the start of the course; the classification of their reported skill levels, or their recreational use of online information at the start of the course, and the extent to which they used online information sources for assignments or for patient related information.

Overall students' use of computers to access information increased between the start of the course and the final phase of the study. Students who considered that they lacked the skills to use computers in their placements reported significantly lower computer use in practice than students who were satisfied with their skills. This was not related to the skills that they had at the start of the course. It is not possible to prove the contribution that the informatics theme made to this, however several students specifically mentioned the theme as a reason why they felt they had the necessary skills to use computers in practice.

7.5 Willing? - Students' Placement Experience

Students reported use of computers, and their descriptions of their experience of computers in their placements show a very variable picture. Less than half of all students reported that they used a computer on most or all shifts. This was lower than the use that they reported seeing by qualified staff. The amount that students used computers was related to the extent they used the computer with their mentor. Both always using the computer with the mentor, and never using the computer with the mentor were related to lower use than sometimes using the computer with the mentor. Without further information about the mentors computer use the reason for this is not clear. If computer use was treated in the same way as learning any other nursing task, with the mentor showing the student the task then supervising them, then allowing them to practice the skills then computer use would understandably be higher than either always having to find the mentor and have the work supervised, or never being supported in computer use by the mentor. This is supported by one student's comment that the mentor supervised the student's use a few times before letting the student *'work as part of the nursing team which included computer usage'*

The attitudes towards IT that the students experienced were a significant factor in how much the students used IT. In placements where students felt encouraged to use computers they used them more than in placements where they did not feel encouraged.

Frequency of use of a computerised system was found by Currell et al (2003) to increase nurses' satisfaction with the system. A normalisation of computers into the work of nurses was also found by the RCN (2004b). Some students in this research experienced a supportive environment where computers were a normal part of the daily work of the qualified staff. Students commented on several factors that characterised this type of environment. These included: being offered training on Trust systems; computers being an integral part of their work experience; and mentors actively encouraging the student to use the computer. The senior staff interviewed expected this type of environment to be provided for the students.

A different picture of the integration of computers into nurses' everyday work was reported in several studies. Nurses were discontented with the computerised systems they work with (Darbyshire 2004) and reluctant to use IT in practice (Timmons 2003). Nurses also were more wary about using computers than other healthcare professionals (Kirshbaum 2004). Students in this research commented on qualified nurses having poor skills; a lack of training, or inadequate training on the systems; a culture where using computers was not the norm for nurses; and of providing support for the student to use the computer being a nuisance. The ward based nurses in this research describe variable use of computers. In acute settings the overall picture given is of grudging use where it cannot be avoided. The picture from the care home sector was that it was not a feature of the nurses' everyday work.

The second type of experience, with computers regarded, at best, as somewhat of an essential nuisance or as a tool to be avoided completely, was the one more frequently experienced by the students in this study.

7.6 Exploration of the reasons for the barriers found.

The culture that the NHS wishes to create, where informatics skills are a core requirement for professionals and embedded in all stages of clinical education, has yet to be realised. A full exploration of the complex reasons that may underlie this position is beyond the scope of this thesis. However the research, and the reviewed literature, do give some insights into the findings. The suggestions by Hughes (1999), Darbyshire (2004) and Davidson (2005) that the essence of nursing is not recognised and that there is sparse data about the work of the nurse may be contributing factors as the support activities that contribute to the profession of nursing are not as obvious as the direct care giving activities.

7.6.1 Nursing Informatics in Practice

The amount of encouragement that students' felt they received was linked to the culture in their placement area. The information gathered from students' comments and from the group interviews with qualified staff suggests that the prevalent culture is one where qualified staff on the wards lack both computer skills and an appreciation of how they could be using computers to support their work. Students in this study appear to be responding to this culture by not pursuing computer use in their placements.

Some qualified nurses were observed, or reported, coping with their reluctance to use computers by leaving or delegating computer based tasks to others, such as clerical staff. This solution is not a sustainable professional approach. Accurate record keeping, communicating through records, and maintaining confidentiality are professional requirements for nurses (NMC

2004a). If the systems provided for this are electronic then nurses need to be able to work with them. Even if qualified nurses delegate tasks they remain responsible for supervision, so still need to understand the system and its safe use.

Comments from ward based staff suggest that using computers is not seen as an important aspect of providing nursing care, indeed sometimes using computers was considered to be taking time away from patient care. This has also been found by Gosling et al (2004), and Morris-Docker et al (2004). The senior nurses in Gosling et al's study (2004) included staff in posts similar to the senior nurses who participated in this study. They were also of the opinion that information seeking activities to support evidence based care were carried out less by ward based nurses than more senior staff. This was attributed, at least in part, to a ward culture similar to the one found in this study where accessing information about care was not seen as being as important as actually giving care. Morris-Docker et al (2004) stressed that they did not find that nurses were using the Internet to the detriment of delivering care, an observation which carries an implicit suggestion that accessing information is not part of the care giving process. Whilst no-one would suggest that accessing information should be done in preference to attending to a patient in need, the implication is that information seeking activity is valued less than care giving. Whilst nurses, of course, need to plan their activities the suggestion that information seeking activities are less important to quality patient care than direct care giving is not justified when looking at the literature.

The ability of some record systems to meet the needs of nurses has been questioned (Darbyshire 2004). If nurses are not having their needs met by the electronic systems currently provided it may account for some of the

reluctance to use them that has been found. Further investigation into how this can be improved would be extremely worthwhile. It also, however, exemplifies why nurses need to have the knowledge to be able to engage with system developers. This need was identified by the senior nurses in this study who commented on the difficulty of developing their use of computer systems when they lacked the knowledge to fully engage with IT specialists to develop the functionality that they wanted.

Even though all the senior nurses who contributed to the group interviews were positive and were enthusiastic users of IT in the workplace this is not typical of all nurse managers. At around the same time that this cohort of students was starting their course, the need for students to have access to Trust computer systems was raised in a meeting with senior nurses involved in the education of students in placement. These senior nurses did not consider that students needed to experience systems, such as Electronic Patient Records systems, in practice. They did not think that the Trusts had the capacity to train students on Trust systems or to provide them with passwords (personal correspondence, email, Practice Placement Education Group, 30 July 2002).

This study has found that there is a gap between the IT competencies identified as necessary for a nurse, and those that nurses actually have. There are several possible explanations for this. One is that some staff will have qualified before registration required any IT competence; It may be that the education system the nurses graduated from did not place a high emphasis on establishing that the students were gaining these competencies; It may be that the systems are developing quicker than the nurses can stay updated, or that qualified staff do not consider training in informatics to be as high a priority as other demands for continuing professional development.

The lack of skills of qualified nurses, especially those acting as mentors to students, is a concern as these are the nurses that are responsible for assessing the student's competence in practice. Their ability to assess the student's skills in an area that they themselves do not fully understand, or value, is questionable.

The acceptance of nursing informatics as an important part of nursing is inevitably influenced by aspects of the nature of nursing; Nursing is emerging from under the coattails of medicine as an autonomous profession (Baly 1995, Rafferty 1996), this has meant that it has to articulate the essence of what it actually does. One question asked is is nursing an art or is it a science? Within this debate there is concern that the art of nursing is in danger of being subjugated to the science of nursing. Seymour et al (2003) discussed a reluctance by nurses to fully engage with research, and considered that this may be because emphasising scientific knowledge served to devalue the art of caring. Nursing informatics is more aligned with the science of nursing, which may contribute to some nurses' reluctance to engage with it.

Whatever the contributing reasons, the clinical nurse lead for the Connecting for Health programme, Heather Tierney Moore, may have the problem summed up (Davidson 2005) when she says that

'IT is a big turn off for nurses..... if (articles) are branded as IT it's unlikely nurses will bother to pick them up, let alone engage with them'

If the potential benefits to nurses, and to their patients, are to be realised this culture needs to change.

7.6.2 Informatics in Pre-Registration Education

A lack of expertise available within nurse education providers has been found (Hasman 1998, Brittain & Norris 2000, Murphy et al 2004). One study

reported that only 11% of schools of nursing had a tutor with nursing informatics expertise teaching informatics. These studies do not identify who is leading informatics input into programmes where there is no expertise available.

The survey of nursing programme information carried out as part of the review of literature for this study found a variable picture of nursing informatics inclusion in pre-registration education. This supports the findings of the more extensive study by Murphy et al (2002). Some universities did include a range of informatics related elements in their pre-registration programmes. Where it was included it was not generally identified as health or nursing informatics or integrated into the programme as a clearly identified assessed element. As well as looking for nursing informatics units (by that or some other title) the review discussed in section 3.12 looked for topics linked to nursing informatics in unit content information to identify where informatics was contained in other elements of the programme. The majority of programmes only mentioned IT skills, generally as part of study skills or with e-learning. It is possible that the inclusion was implicit rather than explicit, for example all the programmes did mention evidence based care, but only two linked this to informatics, both through basic IT skills. The lack of nursing informatics expertise identified in academia; a lack of awareness of what nursing informatics is amongst non-informatics academics; a tendency to equate informatics with IT skills; and a lack of visible assessment of informatics all serve to leave a question mark over the extent and quality of nursing informatics provision in some pre-registration nursing programmes.

The developing nature of nurse education may also be a contributing factor to this seeming reluctance for the profession, and its educators, to fully engage with nursing informatics. A significant change in nurse education came with

the move into higher education in the early 1990s. This brought with it a range of expectations about the characteristics of a nurse, and of nursing education. As discussed by Becher and Trowler (2001) higher education was already occupied by various tribes each with their own territory. Nursing education has had to work hard to establish its own territory within higher education; indeed many would argue that it still is. At the same time it is challenged by the intermixing of academic disciplines that has given rise to nursing informatics.

Nursing informatics characterises the new fields of study that Becher and Trowler (2001) discuss, drawing on a variety of disciplines. In doing so it is having to shape its tribal identity and develop its territory. This might lead to it not being fully understood, a position that the students and the qualified staff in this study seem to concur with. It could also lead to the disciplines that it is drawing on academically feeling threatened by it, as Foster (1993) suggests librarians are doing by 'creating' the concept of information literacy in response to changes in the access to information which they see as threatening their position and expertise.

7.7 Shared Responsibility

As well as being one of the drivers in the development of nursing informatics from a specialist sub discipline of health informatics into something that is feasible for all nurses, the rapid increase in computer availability and use is also one of the biggest challenges that nursing informatics has to overcome. Computers and the Internet are rapidly becoming ubiquitous in the UK. In the space of a few years the web culture has moved from TV presenters laboriously reading web addresses with every colon and slash carefully enunciated, to web addresses being something now printed onscreen as a matter of routine, with viewers encouraged to 'email your comments in'.

With this increase comes a tendency to assume that everyone knows about the use of computers and the Internet. Students in this study did not know how to assess their own skills against professional parameters, as long as they knew enough to get by they considered that they had good skills. One of the senior staff interviewed also used this approach, saying '*I think most nurses know how to put a word in google*'. This study however has shown that this interpretation of 'good' is not good enough for use to support professional practice. As the Melton, Rutland and Harborough PCT incident shows, a little knowledge can be a dangerous thing.

Nursing informatics not only needs to be better understood by nurses, at all levels within the NHS and by nursing academics, it needs to overcome a false perception on one hand that it is something that everyone already knows about, and a cultural issue on the other that its something that is not as important as care giving.

As has been shown in this study new nursing students' lack of skills at the start of their course does not affect their use of computers in placement, as long as their educational experience includes development of the necessary expertise. That however is only one part of the students' needs if they are to use computers in practice settings. They also need to encounter a supportive environment. This study suggests that not only do many nursing courses not value nursing informatics or see it as an important element of nurse education, but that many practice settings do not fully understand or value it either.

One theme that recurs in nursing education literature is the concept of a 'theory-practice gap' in pre-registration education. Corlett (2000) found that when students felt that what they were being taught differed to what they

experienced in practice their reaction was to question the credibility of the teacher, rather than the practice methods they experienced. Student nurses develop their attitudes to nursing activities through their socialisation into nursing that occurs on placements (Corlett 2000, Henderson 2002). When considered with the picture created by Baly (1994) of nursing being a profession historically characterised by obedience and conformity it may account for slow progress in adopting new elements of the discipline such as research (Seymour et al 2003) and nursing informatics (Hovegna 1998). Professional socialisation has however been found to be a dynamic, not a static, concept (Howkins & Ewens 1999) which suggests that change can be achieved. Education is a significant factor in creating this change.

The importance of including nursing informatics in pre-registration curricula as well as in programmes for qualified staff has been stressed (NHS Executive 1999a, NHSIA 2001a, Murphy et al 2004, NHSIA 2004). NHS sponsored studies however have found progress is hampered by negative attitudes and lack of understanding. In spite of the policy documents and research showing the need and the benefits for patient care it has been found that there is little integrated development happening between higher education and the NHS, with both having a negative view of the clinical relevance of health informatics and technology within pre-registration courses (NHSIA 2004).

A two pronged attack is needed to create the culture change necessary to embed informatics into nursing practice. There is a lack of expertise in both practice and in education. This needs to be addressed, and champions need to be created who can support staff and students. This needs to be supported from the top - of the profession; of education; and of the NHS.

7.7.1 Practice

It has been noted (Ensor & Page 2004) that the prevailing culture in the NHS is one of targets and measurement. If something is not explicitly included as a target it tends to be afforded a lower priority. An analysis of the ability of targets to deliver real quality or change is beyond the scope of this dissertation. However, whether targets are the solution or not, informatics exclusion from them and the resulting low priority afforded to informatics does need to be addressed. Currently many non-informatics policy documents include informatics implicitly rather than explicitly. Given the lack of awareness and understanding of nursing informatics making the inclusion implicit means that people without an understanding of informatics may not see where it fits. A lack of visibility can also easily be equated to a lack of real importance, so nursing informatics needs to be made highly visible in all policy documents.

7.7.2 Education

Nursing education needs to recognise nursing informatics as an academic discipline. Exploring curriculum models is outside the scope of the dissertation, however whether informatics is taught as a discrete unit or integrated across the curriculum students need to be given an awareness of the complete discipline, not just of aspects of it. Informatics needs to be included in assessment so that it can be seen that students have developed the required expertise. To achieve this nursing informatics education needs to be led by an expert in the discipline. A significant role for this expert needs to be to work with academic and practice colleagues to ensure that awareness of informatics is present across the curriculum, and that the education provider can be confident that assessors in practice have the ability to assess these skills. In the same way, and for the same reasons, that practice needs to visibly include informatics. Education quality mechanisms need to explicitly

include informatics in university and placement aspects of education in their quality processes.

7.8 Nursing Informatics Programme Proposal

In order to deliver effective education in pre-registration programmes there needs to be clarity about what needs to be included. Whilst it would be foolish to ignore the requirements of the NHS, nurses need enduring and transferable skills and knowledge, not a skill set that will enable them to work within one government policy at one moment in time.

Rather than accepting the NHS description of competency, this proposal prefers the concept of the expert (Dreyfus & Dreyfus 1986, Dreyfus 2004) to best describe the requirements of the qualified nurse. Having the 'know how' that they discuss will mean that nurses use computers as tools to achieve a task rather than being the task itself. To ensure that information governance standards are maintained they should be inherent in every task, rather than being something that needs to be thought through every time a computer is used.

In order to develop expertise rather than task based skills or competence the holistic overview of the use of information and technology needs to be introduced as a discrete discipline. Teaching the skills in a variety of different contexts, such as information literacy, or basic computer skills, may be an effective way of introducing some skills, but does not address the need to support students to develop expertise across the range of topics and applications that comprise the discipline of nursing informatics.

Drawing on the literature discussed in chapters 2 and 3 and the results obtained from this research I have developed a model of the informatics needs of the newly qualified nurse. In preference to trying to devise yet

another list of skills or competencies that nurses require to be able to work effectively with information and technology I have grouped the areas that nurses need to develop expertise in into broad groups that not only articulate the expertise that nurses need to develop, but also indicates why they are needed, rather than providing a context free check lists of skills. The model uses the QAA subject benchmark approach rather than attempting to suggest a prescriptive national curriculum. Adopting a descriptive approach allows pre-registration nurse education providers to decide how to include the essential elements necessary to achieve this in their education programmes in a way that suits the culture and approach of their programme.

Considering the lack of awareness of the nursing informatics expertise needed for safe practice by both students and the nurses who support them in practice, and students' inability to evaluate their own skills it is important that this informatics theme is led by a suitably experienced informatics expert. The theme needs to be assessed in both the theory and practice elements of the programme.

All nurses need the expertise to:

1. *Understand the fundamental computer basics essential for effective use of information and technology, including:*

- i. At a user level know how a computer and associated equipment works and undertake simple problem solving
- ii. Understanding the function and use of various types of software and be able to select an appropriate software application for a given purpose
- iii. Using electronic systems to aid communication, for example Internet services and patient records systems
- iv. Identifying the need for help and knowing how and where to obtain it
- v. Keeping up to date with software and hardware developments, having the ability to transfer skills and knowledge to new equipment and systems

2. Identify and meet information needs to support both own professional practice and patients' information needs, including:

- i. Knowledge of computer based information systems available to meet those needs
- ii. Understanding the structure of data, information and health record systems.
- iii. The ability to locate and recall appropriate information
- iv. Evaluating the information, with reference to the purpose for which it was obtained
- v. Manipulating, organising, sharing and presenting the information as necessary and in appropriate formats
- vi. Keeping up to date with developments in appropriate information systems and transfer skills and knowledge
- vii. Mentoring and supporting student nurses in developing safe and effective use of technology

3. Work within an Information Governance framework to ensure safe, legal and ethical use of information and technology, including:

- i. Understanding security, ethical and legal issues of computer use in healthcare settings
- ii. Having the expertise to ensure that the principles are applied in practice
- iii. Appreciating the abilities and limitations of technology and ensuring that systems are used to the benefit of patients

All nurses need an appreciation of, and nurses moving into more senior roles such as nurse managers or clinical specialists need expertise in

4. Information for Quality, Including:

- i. Using computer systems to provide information about the quality of services / care given.
- ii. Working with IT specialists as necessary, developing the capability of current systems, or developing new systems, to meet identified need or respond to changes in technology and working practices, and understanding the change management issues in introducing new or altered systems into the workplace
- iii. Manipulating data and presenting it to an audience in an appropriate format

- iv. Using the Internet to provide patients with information about their service or specialism,
- v. Mentoring and supporting junior nurses and other colleagues in their safe and effective use of technology

Whilst the term computer is used this is because it is the most frequently used piece of information technology in the nursing workplace. It is not intended to suggest that what is currently recognised as a computer will always be the technology in use. Given that nurses retire at 55 a newly qualified nurse who enters nurse education directly from school will have a potential working life of over 35 years. The changes in technology over the last decade have moved computing from the realm of specialists to its current position as an essential tool for non-computing professionals. It is hard to speculate how IT will change over the professional life of a nurse, but it is impossible to believe that changes will not happen. Personal digital assistants (PDAs) are already being used in healthcare settings and other technologies, such as mobile phones, are becoming ubiquitous and ever more sophisticated. One very important aspect of developing nurses who are experts in using this technology is to equip them with the skills and knowledge to enable them to respond to new software and technology as it develops.

7.9 Summary: Ready, Willing and Able?

This chapter initially explored the uses that nurses make of computers in their work. This includes supporting the quality and safety of patient care; information seeking to support evidence based practice; record keeping; communication; and assisting patients with their information needs. The need for this to be done within an information governance framework was identified.

The chapter then moved on to discuss student nurses' IT skills. At the start of their pre-registration education the overall picture of the cohort participating in this research was one of high computer ownership, but lower computer use. Use of the computer tended to be unsophisticated. Internet services other than the web and email were not often used. Use of applications was quite basic, as tasks became more complex students reported ability to carry out the task fell. Students were found to be unable to assess their skill levels, appearing to use a measure of 'good enough' skills for a task rather than having an appreciation of the skills required for safe professional use of computers.

Although the students were not found to be ready to use computers in practice when they started their course they did express themselves to be willing to learn about nursing informatics. Looking at the students' frequency of use, skills and attitudes at the start of the course showed that these factors were not determinants of their use of IT in placement at the end of the second year of the course. By this time the students had had an informatics programme (appendix two) and students' comments suggest that this programme did influence their confidence in their ability to use computers in placement.

Having confidence in their skills to use computers in practice was a major determinant of students' actual use of computers in practice. It was not however sufficient by itself to translate into a willingness to use computers. Being encouraged to use computers was the other major determinant. Skills were essential; if students did not have confidence in their skills their use of computers was low whatever perception of encouragement they reported. Having confidence in skills however did not always equate to high levels of computer use. Once students felt reasonably confident in their skills the

amount that they felt encouraged to use computers became the key determinant. Without encouragement even students who felt they had skills did not use computers on many shifts.

Students, and the qualified nurses who support them in practice, lacked awareness of the full range of expertise that was actually required for the students to be safe and effective users of computers in practice. The combination of lack of awareness of the expertise required and an inability to assess personal skill levels, suggests that students' confidence about their ability to use computers in practice may be misplaced. Qualified nurses considered that they had training needs, but found it difficult to meet those needs. This makes the provision of an informatics education programme an essential requirement in pre-registration nursing.

With well prepared students the practice culture becomes a crucial factor in students' use of computers in practice. The environment most frequently encountered by the students was not one that made them feel encouraged to use computers.

Some of the possible reasons for the barriers that exist in practice were explored. One major factor identified in the literature, from the students and from the qualified nurses in this study was that the nursing culture does not value support activities as much as it does direct care giving activities. Nursing informatics was also found to not be highly valued in education. Some pre-registration courses lacked input from a nursing informatics expert. Some courses contained elements that could be nursing informatics however they appeared to be fragmented across the course, with nursing informatics as a discipline not mentioned. Nursing informatics is a discipline that is not well understood by nurses in practice or in education. It is therefore important that

it is explicitly included in NHS policy documents, especially those not informatics related; in education programmes; in education quality mechanisms; and in professional body standards for practice.

This study has found that in order for students to use their informatics skills in practice both the theory and practice elements of their education need to work together to ensure that students have the expertise that they need, and a supportive environment to apply those skills in. The chapter concludes with a proposal for an informatics theme to be included in all pre-registration programmes.

8 Conclusions

8.1 The Research

The question that this study set out to address was: Are nurses entering the profession ready, willing and able to utilise information and technology to support their professional practice and development? In doing so it adopted an original approach, exploring the question through the experiences of a cohort of student nurses, seeking information from them at three stages in their nurse education, over the three years of their course. Using a longitudinal approach allowed for the exploration of emerging competencies and confidence in nursing informatics to be explored. This type of research is critical for providing a more in-depth look at the factors related to the use of IT in practice.

The information from students was gathered only by questionnaires. The initial intention had been to also interview some students, this did not happen for several reasons. To maintain the confidentiality of the questionnaires the only way of contacting the students who were willing to be interviewed was through email addresses they had given on the third questionnaire. When the email addresses were used some proved to be illegible, some 'bounced' as undeliverable, and some just remained unanswered, leaving insufficient participants for even one group. With the benefit of hindsight email should not have been relied on. A separate form should have been enclosed asking for full contact details, for return separately to the questionnaire. Although including student interviews would have been interesting the students did make good use of the open questions on the questionnaire and much useful information was collected in this way.

8.2 Areas for Further Research

Information Technology in the nursing workplace is not new; it is however evolving. As the literature review has shown the publication of Information for Health (NHS Executive 1998) was intended to change the way that it was used, shifting the focus to the patient, and using technology to improve the patient experience. To achieve this shift in emphasis the NHS was aiming to create a culture change, with informatics skills being seen as a core requirement for all professionals, integrated into all stages of clinical education.

This change is happening across the developed world, similar policies to the UK's can be found in much of the world, including the USA, Canada, Australia and New Zealand. This is therefore not something just needed by nurses working in the UK. Nurses need the expertise to engage with IT to streamline administrative nursing tasks, create more time for patient care, monitor the quality of the care they are giving, and work with patients to ensure that the patients' information needs are met wherever they wish to work. This research has found that the culture change required has not yet fully happened. Whilst nurses use the systems that they are provided with it is often done grudgingly to achieve the task in hand rather than engaging with them as tools that can help to develop practice and deliver quality care. Information seeking activities are valued less than direct care giving activities.

The academic discipline underpinning the information agenda is nursing informatics. This however is not valued within nursing education any more than IT is in clinical settings. Some possible reasons for this have been identified, such as the struggle of any new academic discipline to establish its territory, the historic 'obedient' culture of nursing and the nature of nursing. One aspect not included in this research was the level of academic award,

both of the students and the qualified nurses. This may prove to be an interesting area for further research.

The expertise that qualified nurses require needs to be clearly articulated. Basic computer skills are essential, however knowledge is as important as skills. Nurses need to be able to work with information and with technology to be efficient in this new information led culture. Systems are not static, new technologies are emerging and new uses of existing technology found, therefore transferable skills are essential. This needs to be supported by understanding of the principles and implementation of the legal and ethical framework of information governance. To achieve this the emphasis needs to move away from the computer and basic skills to a comprehensive nursing informatics focus. The interviews with senior nurses suggest that nurses' informatics requirements will increase as nurses' roles develop. This research focused on pre-registration education, further research to investigate the CPD needs of nurses, especially those entering senior and extended roles, would compliment this study.

Nursing Informatics needs to be explicit rather than implicit in all aspects of pre-registration education. It is frequently an 'unknown unknown', and as such if it is not made explicit it is likely to be overlooked at best, or at worst misunderstood. It therefore should be a clearly identified, assessed element of all pre-registration nursing programmes. Nursing informatics needs to be visible in both the campus based and practice based elements of pre-registration nursing programmes, and supported by suitably knowledgeable staff. The brief review of programme documentation undertaken as part of this study found that nursing informatics was not included as a discrete subject. The study has also raised questions about who is leading nursing informatics in academia, and about the competence of, and support for, the

nurses assessing this part of pre-registration education in practice. Further research into this would generate valuable information to support the development of the nursing informatics experts identified as essential in this research.

8.3 Ready, Willing and Able?

This research has found that whilst there are concerns there are also reasons to be optimistic about the future of nursing informatics education. Student nurses are not ready to use computers to support their practice at the start of their pre-registration education, but the students in this study expressed very positive attitudes about what they did not even then realise was nursing informatics. Their lack of initial expertise was not a barrier to a good education programme helping them to achieve confidence in their developing expertise. Positive placement experience led to them applying the expertise in practice. Some even used their expertise to support qualified nurses in practice to improve their knowledge and skills.

8.4 A Vicious Circle

Only a few students in this study experienced the support structures necessary for them to apply their developing informatics expertise. Just after the publication of Information for Health (DoH 1998) the NHS Executive (1999b) found that students' exposure to informatics was opportunistic, and depended on the Trust where the clinical experience was gained. This research has found this to still be true.

The literature reviewed suggests that some education programmes lack sufficient input to develop the expertise students need. This research supports findings in the literature which suggest many practice placements do not support students in translating university informatics education into practice. The danger of this is that a vicious circle is created. These student nurses qualify and become the role models for future nurses. If they lack informatics

expertise and accept a professional identity that does not value nursing informatics then students will continue to experience unsupportive practice placements. Without adequate awareness of what nursing informatics actually is it becomes an 'unknown unknown', so there is little impetus to update and develop skills as job needs change. These nurses may later become nurse educators, and may also bring this lack of understanding back into education.

8.5 Breaking the Circle; Creating an Upward Spiral

Pre-registration nursing education is in a unique position to support the change necessary to break this circle and create an upward spiral. The students in this research were generally ready and willing to use informatics if given the right environment to develop in. Creating and supporting nursing informatics academics who can take the lead in embedding informatics in education programmes will ensure that students are given an education experience that develops their ability. Not only will these academics be able to influence the inclusion of informatics in pre-registration programmes, part of their role needs to be to work with the mentors who support students in practice to ensure that mentors are knowledgeable and positive role models. This will mean not only that nurses enter the profession understanding nursing informatics but also that as these nurses progress to be mentors they will be able to provide adequate support and encouragement to students. They will have sufficient awareness of nursing informatics to be able to identify their educational and developmental needs as their jobs change. If they move into senior positions, or into education, they will add further impetus to the upwards spiral as they will be positive role models for ward based nurses and educators.

9 References

- American Library Association. (1989). *Presidential Committee on Information Literacy: Final Report*. online at <http://www.ala.org/ala/acrl/acrlpubs/whitepapers/presidential.htm> [Accessed 20 August 2004]
- Anon. (2005). *The Root Cause Analysis into an Incident Resulting in Patient Identifiable Information Being Disclosed into the Public Domain*. Melton, Rutland and Harborough Primary Care Trust. online at http://www.mrh.nhs.uk/site/trustdocs/corpdevandpubinv/WWW/1570_28-9-2005_RCA%20Final%20report.pdf [Accessed 29 Sept 2005]
- Arber, S. (2001). *Designing Samples*. In Gilbert N (Ed) *Researching Social Life*. 2nd Edition. London: Sage.
- Baker C. Wuest, J. & Stem, P. (1992). Method Slurring: the grounded theory phenomenology example. *Journal of Advanced Nursing*. 17, 1355-1360
- Baly, M., (1995). *Nursing and Social Change*. 3rd Edition. London: Routledge.
- BBC, (2000). *Lifesaving laptops stolen*. BBC News 27 October 2000. Online at <http://news.bbc.co.uk/1/hi/scotland/993513.stm> [Accessed 20 March 05]
- BBC, (2002). *Baby research laptop recovered*. BBC News 29 July 2002. Online at <http://news.bbc.co.uk/1/hi/scotland/2158463.stm> [Accessed 20 March 2005]
- BBC, (2003a). *Doctor's research stolen on laptop*. BBC News 15th January 2003. Online at <http://news.bbc.co.uk/1/hi/england/2661767.stm> [Accessed 20 March 2005]
- BBC, (2003b). *Medical records found on computer*. BBC News 10 March 2003. Online at <http://news.bbc.co.uk/1/hi/england/2836193.stm> [Accessed 20 March 2005]
- Becher, T. & Trowler, P., (2001). *Academic Tribes and Territories. Intellectual enquiry and the culture of disciplines*. 2nd Edition. Buckingham: Society for Research into Higher Education and Open University Press.
- Beckers, J. & Schmidt, H. (2003). Computer experience and computer anxiety. *Computers in Human Behavior*. 19, 785-797.
- Blaxter, L., Hughes, C. & Tight, M. (1996). *How to Research*. Buckingham: Open University Press.
- Bond, C. (2004). Surfing or drowning? Student nurses' Internet skills. *Nurse Education Today*. 24 (3), 169-173.
- Bournemouth University. (2003). *Research Ethics Policy and Procedures*. Bournemouth University.
- Bowles, N. Mackintosh, C. & Torn, A. (2001). Nurses' communication skills: an evaluation of the impact of solution-focused communication training. *Journal of Advanced Nursing*. 36 (3), 347-354
- Brennan P. & Fitzpatrick, J. (1992). On the essential integration of nursing and informatics. *Clinical Issues in Critical Care Nursing*. 3, 797-803.

- Brittain, J. & Norris, A. (2000). Delivery of health informatics education and training. *Health Libraries Review*. 17, 117 -128.
- Brown, C. Murphy, T. & Nanny, M. (2003) Turning techno-savvy into info-savvy: authentically integrating information literacy into the college curriculum. *The Journal of Academic Librarianship*. 29 (6), 386-398
- Burns, N. & Grove, S. (2003). *Understanding Nursing Research*, 3rd edition. Philadelphia: Saunders.
- Chan, T. Brew, S. & Lusignan, S. (2004). Community nursing needs more silver surfers: a questionnaire survey of primary care nurses' use of information technology. *BMC Nursing* 3 (4). Online at <http://www.biomedcentral.com/1472-6955/3/4>. [Accessed 1 February 2005]
- Chant, S. Jenkinson, T. Randle, J & Russell, G. (2002). Communication skills: some problems in nursing education and practice. *Journal of Clinical Nursing*. 11, 12-21.
- Cheek, J. & Jones, J. (2003). What nurses say they do and need: implications for the educational preparation of nurses. *Nurse Education Today*. 23, 40-50.
- Chua, S. Chen, D. & Wong, A. (1999). Computer anxiety and its correlates: a meta analysis. *Computers in Human Behavior*. 15, 609 623.
- CNN. (2003). Foot in mouth' prize for Rumsfeld. CNN.com 1st December. Online at <http://edition.cnn.com/2003/WORLD/europe/12/01/rumsfeld.english.reut/> [Accessed 20 March 2005]
- Coreil, J. (1995). Group Interview methods in community health research. *Medical Anthropology*. 16, 193-210.
- Corlett, J. (2000). The perceptions of nurse teachers, student nurses and preceptors of the theory-practice gap in nurse education. *Nurse Education Today*. 20, 499-505.
- Corrall, S. (1998). Key skills for students in higher education. *Society of College, National and University Libraries Newsletter*, 15, 25-29.
- Cowie, A. (1989). *Oxford Advanced Learners Dictionary* 4th edition. Oxford: Oxford University Press.
- Creswell, J. (2003). *Research Design. Qualitative, Quantitative and Mixed Methods Approaches*, 2nd edition. Thousand Oaks CA: Sage.
- Crompton, R. & Jones, G. (1988). Researching white collar organizations: why sociologists should not stop doing case studies. In, Bryman, A (ed) *Doing Research in Organizations*. London: Routledge.
- Currell R, Wainwright, P. & Urquhart C. (2003). *Nursing record systems: effects on nursing practice (Cochrane Review)*. In: The Cochrane Library, Issue 2. Chichester, UK: John Wiley & Sons, Ltd.
- Curtis, E. Hicks, P. & Redmond, R. (2002). Nursing students experience and attitudes to computers: A survey of a cohort of students on a Bachelor in Nursing Studies course. *ITIN*. 14 (2), 7-17.

Darbyshire, P. (1999). Nursing, art and science: Revisiting the Two Cultures. *International Journal of Nursing Practice*. 5, 123-131.

Darbyshire, P. (2004). Rage against the machine?: nurses' and midwives' experience of using Computerised Patient Information Systems for clinical information. *Journal of Clinical Nursing*. 13, 17-25.

Davidson, L. (2005). The Magic Glue. *e-health insider*. online at http://www.e-health-insider.com/comment_and_analysis/index.cfm?ID=93 [Accessed 1 Aug 2005]

Dearing, R. (1997). *The National Committee of Inquiry into Higher Education*. Online at <http://www.leeds.ac.uk/educol/ncihe/> [Accessed 2 June 2004]

Denzin, N. & Lincoln, Y. (1998). Entering the Field of Qualitative Research. In: Denzin, N & Lincoln Y (Eds). *Strategies of Qualitative Inquiry*. Thousand Oaks CA: Sage.

DFES. (2003). *The future of higher education*. Norwich: The Stationery Office Limited.

DFES. (2005). *ICT at key stage 3*. Department for Education and Skills. The Standards website. Online at <http://www.standards.dfes.gov.uk/schemes2/secondary ICT/teaching?view=get> [Accessed 10 Oct 2005]

DoH. (2000) *The NHS Plan. A Plan for Investment, a Plan for Reform*. London: Department of Health.

DoH. (2001a). *Building the Information Core - Implementing the NHS Plan*. London: Department of Health.

DoH. (2001b). *Working Together – Learning Together. A Framework for Lifelong Learning for the NHS*. London: Department of Health

DoH. (2002a). *Learning from Bristol. The Department of Health's Response to the Report of the Public Inquiry into children's heart surgery at the Bristol Royal Infirmary 1984-1995*. London: Department of Health. Online at <http://www.doh.gov.uk/bristol inquiry response/bristol response full.pdf>. [Accessed 20 Nov 2003]

DoH. (2002b). *Making Information Count. A Human Resources Strategy for Health Informatics Professionals*. London: Department of Health.

DoH. (2002c) *Delivering 21st century IT support for the NHS: National Strategic Programme*. London: Department of Health.

DoH. (2004a). The NHS Knowledge and Skills Framework (NHS KSF) and the Development Review Process (October 2004). London: Department of Health. Online at http://www.dh.gov.uk/PublicationsAndStatistics/Publications/PublicationsPolicyAndGuidance/PublicationsPolicyAndGuidanceArticle/fs/en?CONTENT_ID=4090843&chk=dyrb/a [Accessed 21 May 2005]

- DoH. (2004b). NHS Job Evaluation Handbook Second Edition (October 2004). London: Department of Health. Online at http://www.dh.gov.uk/PublicationsAndStatistics/Publications/PublicationsPolicyAndGuidance/PublicationsPolicyAndGuidanceArticle/fs/en?CONTENT_ID=4090845&chk=jZS4ev [Accessed 21 May 2005]
- DoH. (2004c) Reconfiguring the Department of Health's Arm's Length Bodies. London: Department of Health.
- Donald, A. (1998). *The Front-Line Evidence-based Medicine Project Final Report*. NHS Executive North Thames Regional Office.
- Dreyfus, H. & Dreyfus, S. (1986). *Mind over Machine: the power of human intuition and expertise in the era of the computer*. Oxford: Basil Blackwell Ltd.
- Dreyfus, S. (2004). The Five-Stage Model of Adult Skill Acquisition. *Bulletin of Science, Technology and Society*. 24, (3) 177-181.
- ECDL. (2002). *European Computer Driving Licence Syllabus Version 4.0*. Dublin: The European Computer Driving Licence Foundation Ltd.
- Ensor, S. & Page, N. (2004). *Blueprint for Organisational Development and Changing Working Practice*. Consultation Document. Birmingham: NHSIA.
- Estabrooks, C. O'Leary, K. Ricker, K. & Humphrey C. (2003). The Internet and access to evidence: how are nurses positioned?. *Journal of Advanced Nursing*. 42 (1), 73-81.
- Eysenbach, G. (2000). Consumer health informatics. *British Medical Journal*. 320, 1713 - 1716.
- Field, A. & Hole, G. (2003). *How to Design and Report Experiments*. London: Sage.
- Fieschi, M. (2002). Information technology is changing the way society sees health care delivery. *International Journal of Medical Informatics*. 66, 85-93
- Flick, U. (2002). *An Introduction to Qualitative Research*. 2nd edition. London: Sage.
- Foster, S. (1993). Information Literacy: Some Misgivings. *American Libraries*. 24, 344.
- Freudenthal, D. (2001). Age Difference in the performance of information retrieval tasks. *Behaviour and Information Technology*. 20 (1), 9-22
- Gardner, W. & Rozell, E. (2000). Computer Efficacy: Determinants, Consequences, and Malleability. *The Journal of High Technology Management Research*. 11 (1), 109-136.
- Getty, M. Ryan, A. & Ekins, M. (1999). A comparative study of the attitudes of users and non-users towards computerized care planning. *Journal of Clinical Nursing*. 8, 431-439.
- Gilchrist, M. Foreman, K. & Young, P. (2002). Research Project, University of the West of England. In NHAIA 2004. *Health Informatics Education and Development for Clinical Professions: making Progress?*. Birmingham: NHSIA.

- Van Ginneken, A. (2002). The computerized patient record: balancing effort and benefit. *International Journal of Medical Informatics*. 65 (2), 97-119.
- Goossen, W. (1996). Information management and processing: a framework and definition for systems analysis, design and evaluation. *International Journal of Biomedical Computing*. 40, 187-195.
- Gosling, A. Westbrook, J. & Spencer, R. (2004). Nurse's use of online clinical evidence. *Journal of Advanced Nursing*. 47 (2), 201-211.
- Graves, J. & Corcoran, S. (1989). The Study of Nursing Informatics. *Image: Journal of Nursing Scholarship*, 21, 227-231.
- Greene, J. (2002). Mixed-Method evaluation: a way of democratically engaging with difference. *Evaluation Journal of Australasia*. 2 (2), 23 – 29.
- Greene, J. Benjamin, L. & Goodyear, L. (2001). The Merits of Mixing Methods in Evaluation. *Evaluation*. 7 (1), 25-44.
- Greene, J. Caracelli, V. & Graham, F. (1989). Toward a Conceptual Framework for Mixed-Method Evaluation Designs. *Educational Evaluation and Policy Analysis*. 11, 255-274.
- Greene, J. & Thorogood, N. (2004). *Qualitative Methods for Health Research*. London: Sage.
- Griffiths, P. & Riddington, L. (2001). Nurses' use of computer databases. *Health Information and Libraries Journal*. 18, 2-9
- Gross, R. (2004). Making health care safe: are we up to it?. *Journal of Paediatric Surgery*. 39 (3), 258-266.
- Hannah, K. (1985). Current trends in Nursing Informatics: implications for curriculum planning. In Hannah, K. Guillemin, E. & Conklin, D. (eds) *Proceedings of the IFIP-IMIA international symposium on nursing uses of computers and information science*, Calgary, Alberta, Canada, May 1-3, 1985. Amsterdam: Elsevier Science Publishing.
- Hardey, M. (1999). Doctor in the house. The Internet as a source of lay health knowledge and the challenge to expertise. *Sociology of Health and Illness*. 21 (6), 820-835.
- Hasan, B. (2003). The influence of specific computer experiences on computer self-efficacy beliefs. *Computers in Human Behavior*. 19, 443-450.
- Hasman, A. (1998). Education and training in health informatics: the IT-EDUCTRA project. *International Journal of Medical Informatics*. 50, 178-185.
- Hayes, N. (2000). *Doing Psychological Research*. Buckingham: Open University Press.
- Hayes, G. (2002). The Medical Informaticians' Perspective. *NHSIA Conference, Pathways to Professionalism in Health Informatics*. London 2nd June 2002. Online at <http://www.ukchip.man.ac.uk/Library/PathwaysConferenceReport.pdf> [Accessed 12 August 2004]

- Henderson, S. (2002). Factors impacting on nurses' transference of theoretical knowledge of holistic care into clinical practice. *Nurse Education in Practice*. 2, 244-250.
- HMSO. (2000). *Statutory Instrument 2000 No. 2554. The Nurses, Midwives and Health Visitors (Training) Amendment Rules Approval Order 2000*. London: HMSO.
- HMSO. (2002). *Statutory Instrument 2002 No. 253. The Nursing and Midwifery Order 2001*. London: HMSO
- Hovenga, E. (1998). Health and medical informatics education for nurses and health service managers. *International Journal of Medical Informatics*. 50, 21-29.
- Howkins, E. & Ewens, A. (1999). How students experience professional socialisation. *International Journal of Nursing Studies*. 35, 41-49.
- Hughes, M. (1999). Information in resource management: ward managers' perceptions. *Health Informatics Journal*. 5, 20-29.
- IMIA. (2000). *Recommendations of the International Medical Informatics Association (IMIA) on Education in Health and medical Informatics*. International Medical Informatics Association. Online at <http://www.imia.org/endorsed.html> [Accessed 12 August 2004]
- IMIA-NI. (1998). Minutes of the General Assembly of the Special Interest Group on Nursing Informatics. Online at <http://www.imia.org/ni/gamins98.htm> [Accessed 12 August 2004]
- Janesick, V. (1998). The Dance of Qualitative Research Design. Metaphor, Methodolatry, and Meaning. In Denzin, N & Lincoln Y (Eds). *Strategies of Qualitative Inquiry*. Thousand Oaks CA: Sage.
- Johnson, D. & Eisenberg, M. (1996). Computer Literacy and Information Literacy: A Natural Combination. *Emergency Librarian*. 23 (5), 12 - 23.
- Johnson, B. & Webber, S. (2003). Information Literacy in Higher Education: a review and case study. *Studies in Higher Education*. 28 (3), 335-352.
- Jones, R. Tweddle, S. Hampshire, M. Hill, A. & Moulton, B. (2000). *Patient-Led Learning for the Clinical Professions: Fulfilling the Information Needs of Patients*. Bristol: NHS Information Authority, Education, Training and Development Programme.
- Jones, R. Hampshire, A. Tweddle, S. Moulton, B. & Hill, A. (2001) The clinician's role in meeting patient information needs: suggested learning outcomes. *Medical Education*. 35, 565-571.
- Jump, L. (2001). A new way of working: Mapping the Learning to Manage Health information expectations for learning with the outcomes of a pre registration curriculum. In: *NHAIA 2004. Health Informatics Education and Development for Clinical Professions: making Progress?*. Birmingham: NHSIA. Online at http://www.nhsia.nhs.uk/informatics/pages/resource_informatics/default.asp [Accessed 1 Aug 2004]

- Kennedy, I. Howard, R. Jarman, B. Maclean, M. (2001). *Learning from Bristol: the report of the public inquiry into children's heart surgery at the Bristol Royal Infirmary 1984 -1995*. Online at http://www.bristol-inquiry.org.uk/final_report/index.htm. [Accessed 20 Nov 2003]
- Kemper, D. & Mettler, M. (2002). Information Therapy: a tale. *Health Forum Journal*. 45 (1) 16-20.
- Kirshbaum, M. (2004). Are we ready for the Electronic Patient Record? Attitudes and perceptions of staff from two NHS trust hospitals. *Health Informatics Journal* 10 (4), 265-276.
- Kokol, P. Zazula, D. Brumec, V & Kolenc, L. (1999). Nursing Informatics Education for the next millennium. *Future Generation Computer Systems* 15, 211-216.
- Lee T. (1999). *Using Qualitative Methods in Organisational Research*. London: Sage.
- Leininger, M. (1992). Current Issues, problems and trends to advance qualitative paradigmatic research methods for the future. *Qualitative Health Research*. 2, 392-415.
- Martin, A. (2002). *Concepts of ICT Literacy in Higher Education*. Online at http://www.citscapes.ac.uk/products/backgroundreports/files/concepts_ict_HE.pdf [Accessed 01/07/2003]
- Matheson, J. & Babb, P. (eds) (2002). *Social Trends. No 32*. Office for National Statistics. London.
- Mead, D. & Moseley, L. (2001). Attitudes, access or application: what is the reason for the low penetration of decision support systems in healthcare?. *Health Informatics Journal*. 7, 195-197.
- Miller, D. (2002). *National Health Informatics Competency 2002 Annual Survey - Developing NHS IM&T Capability & Capacity*. Birmingham: NHS Information Authority.
- Morgan, G. (1986) *Images of Organisations*. London: Sage.
- Morris-Docker, S. Tod, A. Harrison, J. Wolstenholme, D., & Black, R. (2004). Nurse' use of the Internet in clinical ward settings. *Journal of Advanced Nursing*. 48 (2), 157-166.
- Moule, P. (2003). ICT: a social justice approach to exploring user issues? *Nurse Education Today*. 23, 530 – 536.
- Murphy, J. (ed). (2004) *Editorial, UK Health Informatics Today*, Spring Newsletter no 42. Online at http://www.bmis.org/ebmit/2004_spring_42.pdf [Accessed 13 August 2004].
- Murphy, J. Stramer, K. Clamp, S. Davis, S. Grubb, P. & Gosland, J. (2002). *Health Informatics Education for Healthcare Professionals*. London: RHIED / Department of Health.

Murphy, J. Stramer, K. Clamp, S. Grubb, P. Gosland, J. & Davis, S. (2004) Health informatics education for clinicians and managers — What's holding up progress? *International Journal of Medical Informatics*. 73, 205-213.

Murray, P. (2002). *Nursing Informatics*.
Online at <http://www.nursing-informatics.net> [Accessed 30 July 2002]

NAO. (2004) *Work in Progress: Department of Health: National Programme for IT in the National Health Service*. London: National Audit Office online at http://www.nao.org.uk/publications/workinprogress/nhs_it.htm [Accessed 1 December 2005]

National Academy of Sciences. (1999). *Being Fluent with Information Technology*. Committee on Information Technology Literacy, National Research Council Computer Science and Telecommunications Board. Washington: National Academy Press. Online at <http://www.nap.edu/catalog/6482.html> [Accessed 18 August 2003]

Newell, R. (1993) Questionnaires. In: Gilbert, N (Ed) *Researching Social Life*. London: Sage.

NHS Connecting for Health (2004) *Press Release Ref 2004/0394 NHS to benefit from £40 million Microsoft development*. Online at <http://www.connectingforhealth.nhs.uk/news/0311041> [Accessed 5 July 2005]

NHS Connecting for Health. (2005a). *Health Informatics Programme Basic IT Skills Programme*. NHS Connecting for Health. Online at <http://www.informatics.nhs.uk/cgi-bin/item.cgi?id=1345&d=11&h=24&f=46> [Accessed 20 July 2005]

NHS Connecting for Health. (2005b). *A guide to the National Programme for Information Technology*. London: NHS.

NHS Executive. (1998). *Information for Health. An Information Strategy for the Modern NHS 1998 – 2005*. London: NHS Executive.

NHS Executive. (1999a). *Working together with Information*. London: NHS Executive.

NHS Executive. (1999b). *Learning to Manage Health Information*. Bristol: Enabling People Programme, NHS Executive.

NHS Executive (1999c). *Information Matters*. England: NHS IM&T Clinicians Programme Board.

NHS Modernisation Agency. (2005) *Outlines currently in the NHS KSF National Library (May 2005)*. NHS Modernisation Agency. online at http://www.wise.nhs.uk/cmsWISE/Workforce+Themes/Retaining_and_Developing_Staff/PayandReward/ImplementingAgendaforChange/KSF [Accessed 25 June 2005]

NHSIA. (1999). *Information for Practice. The National Information Management Agenda and You*. Bristol: NHS Information Authority, Education, Training and Development Programme.

- NHSIA. (2001a). *Health Informatics Competency Profiles for the NHS*. Winchester: NHS Information Authority, Ways of Working With Information programme.
- NHSIA. (2001b). *Basic Information Technology Skills Standard for the NHS. Implementing the European Computer Driving Licence*. Winchester: NHS Information Authority, Ways of Working With Information programme.
- NHSIA. (2002a). *Learning to Manage Health Information, A theme for Clinical Education, Moving Ahead*. Birmingham: NHS Information Authority.
- NHSIA. (2002b). *National Health Informatics Competency 2002 Annual Survey - Developing NHS IM&T Capability & Capacity*. Birmingham: NHS Information Authority.
- NHSIA. (2002c). *Health Informatics skills and competencies. A framework to support NSF implementation*. Birmingham: NHS Information Authority.
- NHSIA. (2004). *Health Informatics Education and Development for Clinical Professionals: Making Progress?* Birmingham: NHS Information Authority.
- NMC. (2004a). *The NMC code of professional conduct: standards for conduct, performance and ethics*. London: Nursing and Midwifery Council.
- NMC. (2004b). *Statistical analysis of the register 1 April 2002 to 31 March 2003*. London: Nursing and Midwifery Council.
- NMC. (2004). *The NMC code of professional conduct: standards for conduct, performance and ethics*. London: Nursing and Midwifery Council.
- Norris, A. (2002). Current trends and challenges in health informatics. *Health Informatics Journal*. 8. 205-213
- Ofori, R. & Charlton, J. (2002). A path model of factors influencing the academic performance of nursing students. *Journal of Advanced Nursing*. 38 (5), 507-515.
- ONS. (2004). *Office for National Statistics: Living in Britain. No 31 Results from the 2002 General Household Survey*. London: HMSO.
- ONS. (1997). *Office for National Statistics: Living in Britain. Results from the 1995 General Household Survey*. London: HMSO.
- Oppenheim, A. (1992). *Questionnaire Design, Interviewing and Attitude Measurement*. New York: Pinter Publishers Ltd.
- Ozbolt, J. & Graves, J. (1993). Clinical nursing informatics: developing tools for knowledge workers. *Advances in Clinical Nursing Research*. 28, 407-425.
- Patrikas, E. (1999). Computer Literacy. *T H E Journal*. 27 (5), 60-65.
- Phillips, M. (2004). Avoiding Medical Errors: JCAHO Documentation Requirements. *Journal of the American Dietetic Association*. 104 (2), 171-173.
- Pillar, B. & Golumbic, N. (Eds) (1993). *Report of Priority Expert Panel E: Nursing Informatics National Center for Nursing Research*. USA. Online at

<http://nintr.nih.gov/nintr/research/vol4/Contents.html> [Accessed 10 October 2003]

Potts H, & Wyatt J (2002). Survey of Doctors' Experience of Patients Using the Internet. *Journal of Medical Internet Research* . 4 (1). Online at: <http://www.jmir.org/2002/1/e5/index.htm> [Accessed 26 Nov 2003]

Poynton, T. (2005). Computer literacy across the lifespan: a review with implications for educators. *Computers in Human Behavior*. 21, 861-872

Priselac, M. (2003). Information technology's role in improving practice environments and patient safety. *Nursing Outlook*. 51 (3), S11-S13.

Proctor, M. (2001). Measuring Attitudes. In: Gibert, N. (Ed) *Researching Social Life*, 2nd Edition. London: Sage.

Protti, D. (2002). *Implementing Information for Health: Even more Challenging than expected?* London. Department of Health.

QAA. (2001). *Benchmark statement: Health care programmes*. Nursing. Gloucester: Quality Assurance Agency for Higher Education.

Rafferty, A. (1996). *The Politics of Nursing Knowledge*. London: Routledge.

RCN. (2004a). *Nurses and NHS IT developments. Results of an online survey by Nursix.com on behalf of the Royal College of Nursing*. London: Royal College of Nursing.

RCN. (2004b). *Speaking Up. Nurses and NHS IT developments. Qualitative analysis results of an online survey by Nursix.com on behalf of the Royal College of Nursing*. London: Royal College of Nursing.

Rice-Lively, M. & Racine, J. (1997). The Role of Academic Librarians in the Era of Information Technology. *The Journal of Academic Librarianship*. 23 (1), 31-41.

Robertson, S. & Shortis, T. (undated). *Interactive Education Project, Policy and Management Theme*. Bristol: Graduate School of Education, University of Bristol. Online at http://www.interactiveeducation.ac.uk/policy_man.htm [Accessed 22 Dec 2005]

Russell, A. & Alpay, L. (2000). Practice nurses' training in information technology: report on an empirical investigation. *Health Informatics Journal*. 6, 142-146.

Saba, V. (1997). A look at nursing informatics. *International Journal of Medical Informatics*. 44, 57-60.

Saba, V. (2001). Nursing informatics: yesterday, today and tomorrow. *International Nursing Review*. 48, 177-187

Saranto, K. & Hovenga, E. (2004). Information literacy—what it is about?: Literature review of the concept and the context. *International Journal of Medical Informatics*. 73 (6), 503-513.

Saranto, K. & Leino-Kilpi, H. (1997). Computer Literacy in nursing: developing the information technology syllabus in nursing education. *Journal of Advanced Nursing*. 25, 377-385.

- Sasse, M. Brostoff, S. & Weirich, D. (2001). Transforming the 'weakest link' – a human/computer interaction approach to usable and effective security. *BT Technol Journal* 19 (3), 122-131
- SCONUL. (1999). *Information skills in higher education*. UK: Society of College, National and University Libraries: Advisory Committee on Information Literacy.
- Seale, C. (1999). Quality in Qualitative Research. *Qualitative Inquiry*. 5 (4), 465-478.
- Seymour, B. Kinn, S. & Sutherland, N. (2003). Valuing both critical and creative thinking in clinical practice: narrowing the research-practice gap. *Journal of Advanced Nursing*. 43 (3), 288-296.
- Shorten A. Wallace, M. & Crookes, P. (2001). Developing information literacy for evidence based nursing. *International Nursing Review*. 48 (2), 86-92.
- Snavey, L. & Cooper, N. (1997). The Information Literacy Debate. *Journal of Academic Librarianship* 23 (1) 9-14.
- SNMAC. (2005). *How to ensure that nurse and midwife education keeps pace with new models of care: Advice from the Standing Nursing and Midwifery Advisory Committee (SNMAC)*. Accessed online http://www.dh.gov.uk/PublicationsAndStatistics/Publications/PublicationsPolicyAndGuidance/PublicationsPolicyAndGuidanceArticle/fs/en?CONTENT_ID=4120772&chk=rLYV3L [Accessed 1 June 2005]
- Staggers, T. & Thompson, C. (2002). Definitions for Nursing Informatics. *Journal of the American Medical Informatics Association*. 9 (3), 255- 261.
- Tashakkori, A. & Teddlie, C. (1998). *Mixed Methodology. Combining Qualitative and Quantitative Approaches*. Thousand Oaks CA: Sage.
- Teddlie, C. (2005). Methodological Issues Related to Causal Studies of Leadership. *Educational Management Administration and Leadership*. 33 (2), 211-227.
- Thompson, C. McCaughan, D. Cullum, N. Sheldon, T. Mulhall, A. Thompson, D. (2001). The accessibility of research-based knowledge for nurses in United Kingdom acute care settings. *Journal of Advanced Nursing*. 36 (1), 11-22.
- Timmons, S. (2003). Nurses resisting information technology. *Nursing Inquiry*. 10 (4), 257-269.
- Torkzadeh, G. & Van Dyke, T. (2002). Effects of training on Internet self-efficacy and computer user attitudes. *Computers in Human Behavior*. 18 (4), 479-494.
- Torkzadeh, R. Pflughoeft, K. & Hall, L. (1999). Computer self-efficacy, training effectiveness and user attitudes: an empirical study. *Behaviour and Information Technology*. 18 (4), 299-309.
- UKCC. (1999). *Fitness for Practice. The UKCC Commission for Nursing and Midwifery Education*. London: United Kingdom Central Council for Nursing, Midwifery and Health Visiting.

UKCC. (2001). *Requirements for pre-registration nursing programmes*. London: United Kingdom Central Council for Nursing, Midwifery and Health Visiting.

UKHIS. (2005). *UK Health Informatics Today Newsletter 47, Autumn*. UK Health Informatics Society.

Welsh Assembly Government. (2003). *Informing Healthcare. Transforming healthcare using information and IT*. Cardiff: Welsh Assembly Government

Williams, K. Woodard, B. Todaro, J. Reid, M. Kirk, T. Hinchliffe, L. Kaplan, A. Beesting, A. Davis, M. (2002). *Information Literacy and ACRL*. online at <http://archive.ala.org/acrl/il/ilacrl/report/report.htm> [Accessed 20 August 2004]

Wilson, J. & Natale, S. (2001). 'Quantitative' and 'Qualitative' Research: An Analysis. *International Journal of Value-Based Management*. 14,1-10.

Yates, S. (2004). *Doing Social Science Research*. London: Sage.

Zhang, Y. (2005). Age, gender, and Internet attitudes amongst employees in the business world. *Computers in Human Behavior*. 21, 1-10.

10 Appendices

Appendix 1. Universities included in the course content review

University of Leeds

Course: BHSc Nursing (Adult) (With Registration on Part 1 of the NMC Professional Register - Adult)

Reviewed: Online unit directory and specifications

<http://webprod1.leeds.ac.uk/banner/dynprogrammes.asp?Y=200405&P=BHS-NUR-12AD>

University of the West of England

Course: BSc(Hons) Adult Nursing

Reviewed: Programme Specification and Programme Handbook.

<http://info.uwe.ac.uk/programmes/displayentry.asp?code=B701&rp=listEntry.asp>

Open University

Course: Diploma of Higher Education (Adult Nursing)

Reviewed: Online module specifications

http://www3.open.ac.uk/courses/bin/p12.dll?Q01D67_7_0

University of York

Course: Post Graduate Diploma with Professional Registration in Nursing (Adult or Mental Health)

Reviewed: Programme Specification

<http://www.york.ac.uk/healthsciences/progspec/pspgdip.pdf>

University of Plymouth

Course: Bsc Hons Nursing Adult

Reviewed: Online module list and descriptions

<http://www.plymouth.ac.uk/pages/dynamic.asp?page=module&id=2539&sort=stage+ASC%2Cmandatory+DESC&debug=&al=1&ss=>

Middlesex University

Course: BSc Honours Nursing with Professional Qualification in Adult, Children's or Mental Health Nursing

Reviewed: Module Specifications

<http://www.mdx.ac.uk/subjects/nm/docs/NIP.pdf>

Appendix 2. Health Informatics Programme

Advanced Diploma / BSc (Hons) Nursing – September 2002 intake

The Health Informatics programme has been designed to help you to develop information and technology skills and knowledge in order to support your current course at Bournemouth University, and your subsequent career as a health professional.

The programme includes essential information on using the University computer system as well as finding, evaluating, managing and presenting information.

You will be given a certificate outlining what you have covered, for your portfolio, at the end of semester 2. In order to receive the certificate you will be expected to attend the Health Informatics sessions and achieve certain outcomes, these will be explained during the relevant lessons.

Session	Topic:	Elements included:
1	Introduction to the Health Informatics, this unit & the Bournemouth University Network	An essential session to introduce the unit and ensure that you are able to log-on to the University system and an introduction to desktop facilities and applications.
2	Library & Information Skills	Library Databases and Passwords Basic database searching using the BNI (British Nursing Index) Electronic journals
3	Introduction to Email	This session will concentrate on communicating using electronic mail, netiquette and other related issues.
4	Email 2 Organisation	Further information on the web-based email system, effective housekeeping of emails and how to send receive, open and save attachments.
5	Internet 1 Introduction to the Internet/WWW	Development of the WWW (World Wide Web), introduction to Internet Explorer and basic navigation skills.
6	Internet 2 Searching Strategies	Learning search techniques and evaluating search engines. How to plan your searching strategy to achieve the right results.

7	Internet 3 Internet for Professionals	Using the Internet for health professionals, Evaluating web based information for patients.
8	Word Processing	This session will cover the fundamentals of Word Processing, using MS Word 97.
9	Excel	An explanation of spreadsheets, their uses and how to organise and analyse data. Presenting data with graphs and charts.
10	Information for Students	Looking at some of the electronic facilities available to you in support of the course, including the IHCS4U website, KSOL and SmartForce.
11	Presenting with PowerPoint	A session using PowerPoint 97 to build a basic but effective presentation using Clip-Art, Charts, graphs.
12	Presenting with PowerPoint 2	You will each produce a short slide show using skills gained in the last session.
13	Working with Information 1	Mini project applying skills gained throughout the unit to Find, Evaluate, Manage and Present Information on a negotiated health related topic.
14	Working with Information 2	
15	Word Processing for Assignments	Using more features of MS Word for improving assignment presentation.

Appendix 3. Questionnaire 1

Information and Communication Technology Questionnaire

Thank you for taking the time to complete this questionnaire. We use the results to help us develop the Health Informatics programme, so your co-operation is appreciated.

Carol Bond, Senior Lecturer, Informatics for Health and Social Care

Section 1. About your computer access

Do you have:	A computer at home		Does it have Internet access?	
All year round	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Term time address only	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Home address only	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Do you have a personal email account?			Yes <input type="checkbox"/>	No <input type="checkbox"/>

Section 2. About your computer use

If you have never used a computer please tick here ☐ and go to section 3

In the last three months have you used:	Weekly	Monthly	Less often	Not at all
Word Processor (e.g. Word)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Spreadsheet (e.g. Excel)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Graphics /art work (e.g. Paintshop)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Presentation package (eg PowerPoint)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The WWW (e.g. Internet Explorer)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Email (e.g. hotmail)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Games	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please give programme name)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If you have an IT qualification, please give details:

Section 2 (cont.)

We ask these questions to try to ensure that our support programme meets students needs, not to judge you personally, therefore please be honest in your answers.

How would you describe your skills in the following areas

	Expert	Good	Basic	Never used
Word processing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Spreadsheets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Using the Internet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please tick all the following that you can do **without** any problems:

- Use a word processor to produce simple documents (e.g. letters) ☐
- Insert a table into a document ☐
- Insert the page number into a footer ☐
- Enter numbers into a spreadsheet ☐
- Put formula into a spreadsheet to total a column of numbers ☐
- Move spreadsheet worksheets within a workbook ☐
- Enter a web address in a browser ☐
- Use a search engine to find information ☐
- Clear the history in a web browser ☐
- Send and receive emails ☐
- Send a picture file as an attachment to an email ☐
- Run a virus check on an email attachment received ☐

Internet Searching (please circle your answer)

If you never search the Internet please tick here and go to section 3 ☐
When you search for information on the Internet which search tool do you use most?

Home page / Yahoo / Ask Jeeves / Google / Hotbot / MSN / AOL / Don't Know

Other (please say which) _____

Do you use basic or advanced search functions? Basic / Advanced / Don't know

Section 3. How you feel about, and use, computers

Please circle the number that best matches how you feel about the following statements, with **1** being strongly agree, **2** agree, **3** disagree, **4** strongly disagree, and **8** where you have never tried it.

I like working with a computer	1	2	3	4	8
I struggle if the computer doesn't do exactly what I expect it to do	1	2	3	4	8
I enjoy surfing the WWW	1	2	3	4	8
I often use email to communicate with friends	1	2	3	4	8
I end up with far too much irrelevant information when I try to find things on the WWW	1	2	3	4	8
I only use a computer if I really have to	1	2	3	4	8
I would need a lot of support if I have to use a computer on this course	1	2	3	4	
The Internet is a good source of public information about health related issues	1	2	3	4	
I often use instant messaging services (eg MSN Messenger or ICQ)	1	2	3	4	8
Health care professionals in the future will have to be able to use a computer	1	2	3	4	
I enjoy exploring new things to do with a computer	1	2	3	4	8
I often participate in online discussions / message boards	1	2	3	4	8
I am looking forward to using a computer as part of this course	1	2	3	4	

Section 4, few details about yourself

Which Course are you on _____

Are you: Female ☐ Male ☐

Age group 18-25 ☐ 26-35 ☐ 35+ ☐

At the end of the academic year prior to starting the course (i.e. June/July) was your main occupation:

School/college student ☐ Unemployed ☐

In paid employment ☐ Other (please state) ☐

Caring for children/dependants ☐ _____

Appendix 4. Questionnaire 2

This questionnaire is intended to find out how you generally find information.

The information that you give will be treated confidentially, and only used for research purposes. It will be held in a dedicated research database, and will not be linked to your course record.

Carol Bond

Senior Lecturer, Informatics for Health and Social Care

1. If you were planning a day out by train to a major tourist attraction some distance away how would you set about finding out necessary information:

1a Checking the train timetable

	Preferred option (tick 1 only)	Would also try (tick all that apply)
Call in to train station	<input type="checkbox"/>	<input type="checkbox"/>
Phone train advice line	<input type="checkbox"/>	<input type="checkbox"/>
Use hard copy timetable	<input type="checkbox"/>	<input type="checkbox"/>
Use an internet timetable	<input type="checkbox"/>	<input type="checkbox"/>
Other (please say what)		

1b Checking the 3 day weather forecast?

	Preferred option (tick 1 only)	Would also try (tick all that apply)
Ask a friend if they have heard it	<input type="checkbox"/>	<input type="checkbox"/>
Watch the TV weather	<input type="checkbox"/>	<input type="checkbox"/>
Use an online weather site	<input type="checkbox"/>	<input type="checkbox"/>
Other (please say what)		

1c Booking the tickets in advance?

	Preferred option (tick 1 only)	Would also try (tick all that apply)
Phone the attraction	<input type="checkbox"/>	<input type="checkbox"/>
Post an application to them	<input type="checkbox"/>	<input type="checkbox"/>
Book through their web site	<input type="checkbox"/>	<input type="checkbox"/>
Other (please say what)		

2. Your 'Self and Health' assignment asked you to find definitions of health from professional and lay perspectives. What information sources did you use for this?

	Professional definitions		Lay definitions	
	Main source (tick one only)	Other sources (tick all that apply)	Main source (tick one only)	Other sources (tick all that apply)
Books	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Journals in the library (hard copy)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Online Journals (e-journals)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Magazines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Newspapers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Charity web sites (eg age concern)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Department of Health or NHS web sites	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Search Engine/directory	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Health gateways online (eg OMNI)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please say what)				

2. So far on this course which, if any, of the following have you used to find course related information?

	Yes	No
books from the library	<input type="checkbox"/>	<input type="checkbox"/>
research databases (eg BNI, Medline, CINAHL)	<input type="checkbox"/>	<input type="checkbox"/>
hard copy journals in the library	<input type="checkbox"/>	<input type="checkbox"/>
online journals from university computers	<input type="checkbox"/>	<input type="checkbox"/>
online journals from a home computer	<input type="checkbox"/>	<input type="checkbox"/>
Search engine/directory	<input type="checkbox"/>	<input type="checkbox"/>

Thank you for your help with this research.
Carol Bond

Appendix 5. Questionnaire 3

Thank you for agreeing to complete this questionnaire. As explained participation is entirely voluntary and does not affect your progress on the course in any way. You may hand the questionnaire back uncompleted if you prefer not to give the information.

All the information that you do give will be analysed using SPSS, and no individuals, Trusts, wards or organisations will be identified in the presentation of the results.

If you have any questions about the research please feel free to contact me.

Carol Bond.

Senior Lecturer Informatics for Health and Social Care

Section 1.

Thinking about the assignments that you did at the end of year 2, did you use the following information sources?

	Yes	No
books	<input type="checkbox"/>	<input type="checkbox"/>
research databases (eg BNI, CINAHL)	<input type="checkbox"/>	<input type="checkbox"/>
hard copy journals	<input type="checkbox"/>	<input type="checkbox"/>
online journals	<input type="checkbox"/>	<input type="checkbox"/>
Internet / WWW (going directly to known or recommended sites)	<input type="checkbox"/>	<input type="checkbox"/>
Internet / WWW (searching for sites through a search engine)	<input type="checkbox"/>	<input type="checkbox"/>

During the 2nd year of the course did you use any of the following information sources to look up information about the care or condition of patients you cared for?

	Yes	No
books	<input type="checkbox"/>	<input type="checkbox"/>
research databases (eg BNI, CINAHL)	<input type="checkbox"/>	<input type="checkbox"/>
hard copy journals	<input type="checkbox"/>	<input type="checkbox"/>
online journals	<input type="checkbox"/>	<input type="checkbox"/>
Internet / WWW	<input type="checkbox"/>	<input type="checkbox"/>
Internet / WWW (searching for sites through a search engine)	<input type="checkbox"/>	<input type="checkbox"/>

Section 2. Use of computers on placement.

Please think back to your last local placement (excluding any overseas or 'out of area' option placements)

Branch Adult / Mental Health / Learning Disabilities / Child

Organisation _____

Ward / Department _____

Date of placement: Start date _____ Weeks _____

Were computers available for nurses working in this setting Yes / No

Please say where computers were located

Did you see qualified nurses using computers

Most shifts ☐

Some shifts ☐

Few shifts ☐

Never ☐

Did you use a ward/clinic based computer during your placement?

Most Shifts ☐

Some shifts ☐

Few shifts ☐

Never ☐ (go to section 3)

When you used a computer was it with your mentor (or another qualified nurse)?

Always ☐

Sometimes ☐

Never ☐

Did the organisation provide you with training on the systems you used?

Yes, compulsory ☐

Yes, optional ☐

No ☐

If Yes, did you attend training? Yes / No

If training was available, but you didn't attend please say why

What did you use computers for?

What did you see qualified nurses using computers for?

Section 3

Do you feel that you were encouraged to use computers during the placement?

Yes, a lot ☐

Yes, a little ☐

Not at all ☐

Please say what makes you feel this way

Do you think you had the skills and knowledge to use computers in the work environment?

Yes, definitely ☐

Yes, some ☐

Not at all ☐

Please say what makes you feel this way

Would you be willing to attend an interview ☐ or focus group ☐ to discuss this in more detail?

If yes, please give your preferred email address for contact

Thank you for taking the time to complete this questionnaire. Your help with this research is appreciated.

Appendix 6. Task Ability and Self Perception of Skills

Task		Self perceived skills		
		Expert	Good	Basic
Enter URL	%	83	87	60
	n	10	100	65
	$\chi^2 = 22.353, df=2, p<0.001$			
Use search engine	%	100	86	59
	n	12	99	64
	$\chi^2 = 26.281, df=2, p<0.001$			
Search effectively	%	83	50	31
	n	10	57	32
	$\chi^2 = 16.346, df=2, p<0.001$			
Clear browser history	%	67	24	8
	n	8	28	9
	$\chi^2 = 27.951, df=2, p<0.001$			
Send an email	%	100	92	51
	n	12	106	56
	$\chi^2 = 52.592, df=2, p<0.001$			
Email a picture	%	83	42	6
	n	10	48	7
	$\chi^2 = 54.694, df=2, p<0.001$			
Virus scan enclosure	%	67	28	3
	n	8	25	3
	$\chi^2 = 41.456, df=2, p<0.001$			